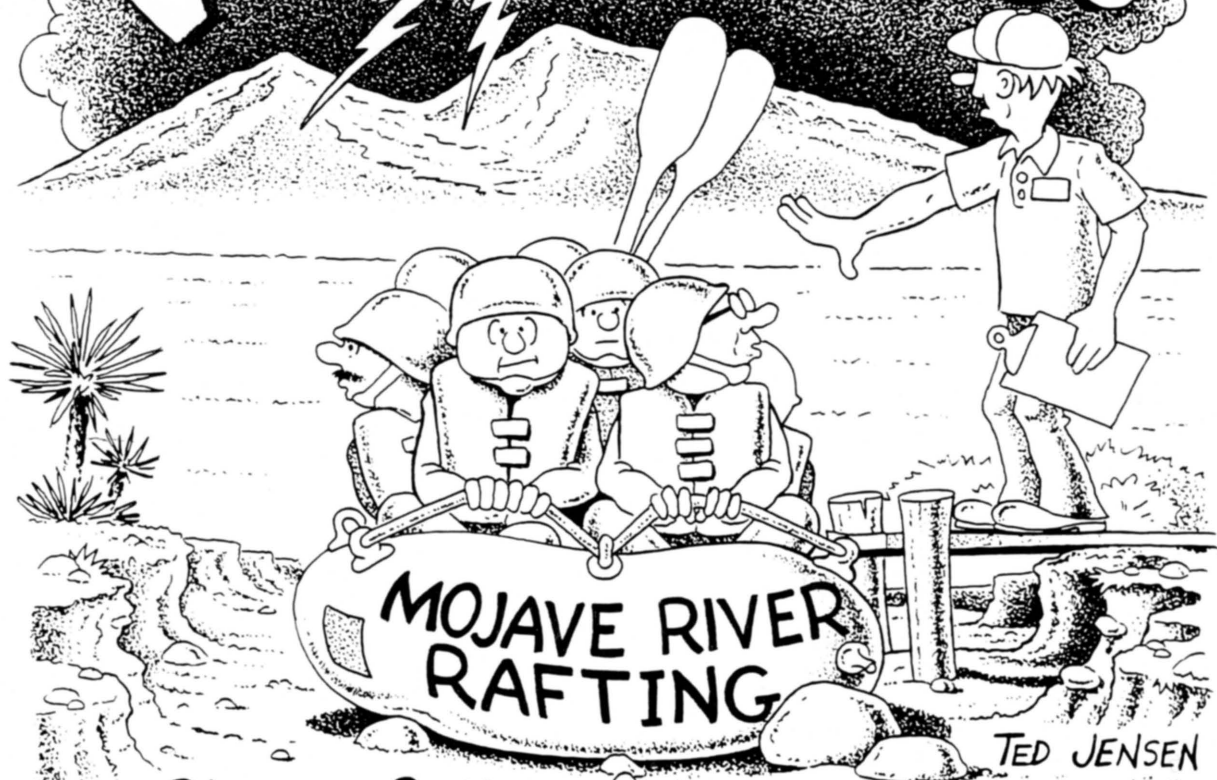


SENTINELS IN THE WEST HEADFRAME

- THE CACTUS MINE ■ IS MINING PAYING IT'S WAY?
- WHEN IS IT A MINE ? ■ THE SOUND OF SILVER : CALICO
- MISTLETOE ■ IS THE RAVEN ENDANGERED ?
- CHRISTIAN MINERS ■ ENVIRONMENTAL GREEN : \$\$\$\$\$



WHITEWATER THRILLS!



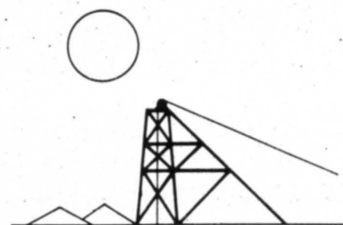
Okay folks ... HANG ON!
The River will be here any minute!

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Ted Jensen

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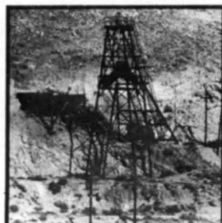
SENTINELS IN THE WEST HEADFRAME



Vol. 1, No. 2

November/December 1990

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INSIDE STORY

The Cactus Mine

47

PERSPECTIVE

Is Mining Paying Its Way ?

54

ENVIRONMENTAL POWER

Environmental Green: \$\$\$\$\$\$

58

Sierra Green

59

MINING DISTRICT

The Sound of Silver: Life in Calico

60

ENVIRONMENT

Is the Raven an Endangered Species ?

70

TESTIMONY

HR 918: The New *Anti*-Mineral Exploration and Development Act of 1991!

74

OPINION

The Ecolosophers Are At It Again

79

VIEW FROM THE SHEAVE WHEEL

When is it a Mine ?

88



MINING FAMILY: The Mulcahys

69

FOR THE RECORD: The Maggie Mine

69

OLD TOOLS OF THE TRADE: The Burleigh Rock Drill

76

FLORA: Mistletoe: The Tree Killer

80

ANTIQUITY: Christian Miners

83

Crossword

82

Further Reading

85

Glossary

87



Cover: Cactus Queen headframe. Note raven's nest near top.

WELCOME TO HEADFRAME

In our continuing efforts to bring you history for the future, in this issue **INSIDE STORY** reviews the Cactus mine. Another example of the cyclical nature of mineral deposits is the revival of the old Cactus Queen property into the CoCa Mines Cactus Mine. The geology of this deposit is another example of the variety of gold deposits and how the exploration of these old properties can reveal deposits unknown and inaccessible to, those who have gone before. In this issue is our **PERSPECTIVE** department debuts. In this instance is revealed the contribution that mining makes to society. Excerpted from a larger work by Dr. Anderson, *Is Mining paying Its Way?* is a look at the contribution mining makes to the economy of Southern California. Although her study was directed at the California Desert and the negative impact the so-called Desert Protection Act (S-21) of Senator Cranston would make, her findings are sound and can be extrapolated to many other areas of the country. Especially revealing is the number of jobs provided per million dollars of ore deposit value and the tax money it can generate.

ENVIRONMENTAL POWER features an article written by Congressman William E. Dannemeyer of the 39th Congressional District of California. The congressman gives us some perspective regarding the financial resources of what he calls the EP has in this country. This well-heeled minority seeks to change our way of life in what is more and more frequently being referred to as a *culture war*. The adverse impacts they are having is reviewed in four areas of interest. In **MINING DISTRICT**, this issue presents Part II which concludes an overview of the geology and history of the Calico Mining District. *The Sound of Silver* gives us a sample of what life in Calico was like along with what killed it and where it is today.

In **ENVIRONMENT** this time we take a peek at another endangered species issue that is just beginning to unfold. In this case there are two species in conflict, both of which are protected. In *Is the Raven Endangered Species?* we see that the impact of the spotted owl may be nothing when compared to the potential impact the Desert Tortoise may have on California. Reflecting this issue is another episode of *Xerobates & Corvus* (p.85), which may have originally caused some puzzlement to our readers in other parts of the country. Although not as well-known to the rest of the country as the spotted owl, as the situation continues to simmer, it is only a matter of time until the country becomes aware of D. tortoise. Somewhat related is the classic *The Raven* by Edgar Allan Poe, which brought him fame and fortune in 1845. Our somewhat embellished presentation (pp.72,73), gives us pause as we try to figure out why in the world it was so popular. *Thumbnail* gives us a glimpse of Poe.

In **TESTIMONY** we are shown some of the devastating impact that HR 918 would have on the industry and ourselves.

Rounding-out this issue we see the impact the Burleigh Rock Drill made on the world and the Comstock, how mistletoe may be more than we expected and how a particular category of miners was treated in antiquity.

Please note our advertizers and patronize them where possible. If this is not convenient, drop them a line and them know you appreciate their support of our efforts in bringing you **Headframe**.

As before, we want **Headframe** to be interesting, informative and perhaps thought-provoking. If you have learned something new from this issue, we will have achieved our goal. Again, welcome to the pages of **Headframe**.

We hope you enjoy what we have prepared for you.

SENTINELS IN THE WEST HEADFRAME



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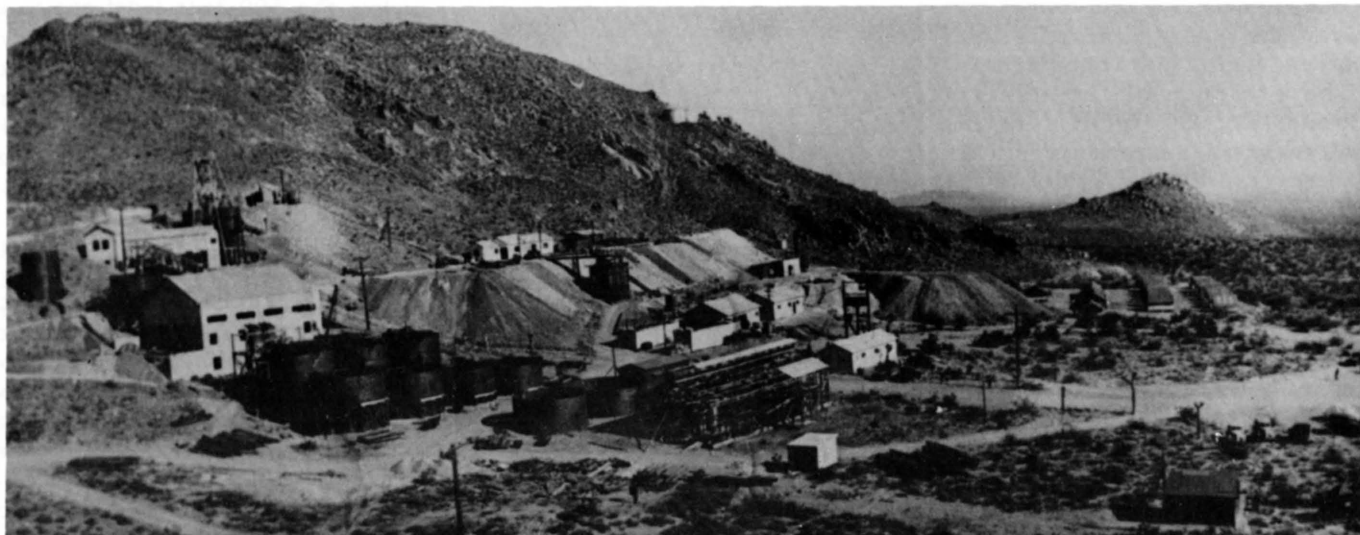
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NOTE: All boldface words in text are found in the glossary, page 87.

INSIDE STORY

THE CACTUS MINE



The Cactus Queen (c.1936) Note headframe, cyanide vats, "company town" far right.

By Marion F. Ely II

How It All Began

Prior to the Great Depression of 1929-33 the term "Financial Panic" was used in lieu of "depression" and "recession". Beginning in 1790, every five or six years a "panic" occurred in the American economy. By 1907, 21 of these "panics" hit the nation's economy.

Until recently, a by-product of these "panics" since the 1840's was an increase in prospecting and the resultant mineral discoveries. The Great Depression was no exception. As times worsened and the rate of unemployment grew, men began to leave the cities and head for the backcountry to prospect in search of the one thing that historically had unquestioned value: gold.

In 1900 Congress established the gold standard by defining the dollar as being 23.22 grains of pure gold. The gold standard was abandoned by the government in 1933. At the same time private ownership of gold was made illegal. Coins were no longer made of gold and all gold coinage was called in by the government. The currency of the United

States was then backed by 25% of its value in gold. All gold produced from mines in the country, by law, was purchased by the government.

After assessing a small charge for refining the raw bullion, the government paid for the gold and silver it contained.

Gold Price Increases 75%

The price of gold originally had been set at \$20.67 per ounce by the government in 1834. As part of the actions taken by the government in 1933 the price was raised in increments until it reached \$35 per ounce. This price was fixed for the next 40 years. This 75% increase in the value of gold stimulated much interest in the precious metal.

Heeding the old mining maxim, "If you want to find elephants, look in elephant country," men headed for old mining districts in the hope of resurrecting old mines and perhaps making new discoveries. One place "elephant country" existed was in southeastern Kern County, California, in the Mojave-Rosamond mining district. The first discovery in this district was made in 1894 (after the

'93 panic) on Standard Hill at the Yellow Rover vein. The same year discoveries were made on Soledad Mountain where the Golden Queen became a major producer until 1910.

DISCOVERY

In 1934 prospectors reentered the district and explored an area known as the Middle Buttes. Being about 10 miles west of Soledad Mountain, it was about 10 miles southwest of the railroad at Mojave and about 13 miles north of the community of Rosamond.

In 1934 important mineral discoveries were made at the Middle Buttes. One of these was known as the Winkler Mine and was located on the east side of the buttes. However, the most important discovery was of **high-grade** gold in a **quartz outcrop** located on the west side of the Buttes. This discovery led to the creation of the Cactus Queen Mine.

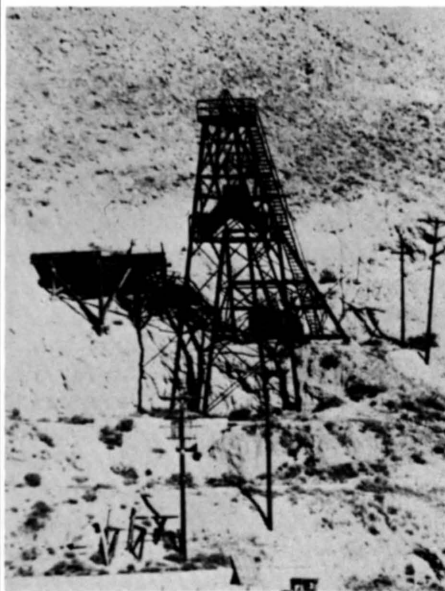
Shortly after its discovery in 1934 the Cactus Queen was purchased by Clifford Burton who leased and later sold the mine to the Cactus Mines Co. Developed with considerable vigor, the Cactus Queen began production in 1935.

The Cactus Queen Mine was opened on the Cactus Vein. The Cactus Vein **strikes** N. 40° E and **dips** 35° SE. It varied in width from three to 20-feet along its 4000-foot strike. It occupies the contact between the quartz **monzonite foot-wall** and quartz **latite hanging wall**.

The presence of the mineral alunite ($\text{KAl}_3(\text{SO}_4)_2(\text{OH})_6$) in the **wall rocks** when associated with the quartz vein was an indicator of the presence of gold. The ore minerals were fine free gold, **electrum**, proustite (Ag_3AsS_3), argentite (Ag_2S).

Gangue minerals associated with the Cactus Vein were, kaolinite ($\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4$), quartz (SiO_2), marcasite (FeS_2), pyrite (FeS_2) and arsenopyrite (FeAsS). Present at various localities in the vein were chalcopyrite (CuFeS_2), galena (PbS), sphalerite (ZnS), tetrahedrite ($\text{Cu,Fe}_{12}\text{Sb}_4\text{S}_{13}$), stromeyerite ($(\text{Ag,Cu})_2\text{S}$), pyrargyrite (AgSbS_3) and covellite (CuS). Near the surface alunite, jarosite ($\text{KFe}_3(\text{SO}_4)_2(\text{OH})_6$), plumbojarosite ($\text{PbFe}_6(\text{OH})_{12}(\text{SO}_4)_4$) and argentojarosite ($\text{AgFe}_3(\text{SO}_4)_2(\text{OH})_6$) were present.

The Cactus Queen



Cactus Queen Headframe

The Cactus Queen ultimately developed 12,000 feet of **drifts** and **crosscuts** in the underground. At the **portal** a steel **headframe** serviced these workings through an 1000 foot inclined **shaft** which ac-

CHEMICAL SYMBOLS

Ag: silver	N: nitrogen
Al: aluminum	Na: sodium
As: arsenic	O: oxygen
C: carbon	Pb: lead
Cu: copper	Sb: antimony
Fe: iron	Si: silicon
H: hydrogen	Zn: zinc
K: potassium	

cessed ten **levels** located at 100-foot vertical intervals. Within the mine and about 350-feet south of the main shaft a **winze** was sunk from the 300 to 1000-foot level. Several hundred feet northeast of the Cactus Queen headframe a second shaft was sunk on the Silver Prince, also on the Cactus Vein. This shaft followed the vein down dip and had levels every 100 feet down to the 600 foot level. A 600-foot exit **raise** reached the surface northeast of the Silver Prince.

A **cyanide vat-leach** recovery system was located downhill from the headframe. During period 1935 to 1943 the Cactus Queen produced more than 230,000 tons of ore. This ore averaged 0.35 ounces of gold and 10 ounces of silver per ton. During the period 1941-43, 7,500 pounds of copper and 2,500 pounds of lead were also produced.

The mine was closed in 1943. In that year The Cactus Queen along with thousands of other mines in the country were shut down by the 1942 War Production Board Order L-208.

As a result of World War II, the Cactus Queen was idled from 1943 to 1947. The Burton brothers mined 23,000 tons of ore between 1948 and 1952 from the Cactus Queen, Shumake and Winkler. This ore averaged 0.5 ounces of gold and 0.9 ounces of silver per ton. In 1957 and 1958 the mill and shops were dismantled and sold by auction.

Although depths of 1000 feet had been reached, very little water had been encountered. The Cactus Queen was considered a dry mine. Pumping rates of only 35 gallons per

minute (gpm) were required to keep it that way. Even at this slow rate however, with the cessation of operations the mine began to inexorably fill with water. All workings below the 500 foot level are now submerged.

By 1963 the Mojave-Rosamond district had an estimated production of \$23,000,000. The Cactus Queen produced over \$5,000,000+ of this total and the Winkler \$150,000+.

UP FROM THE BOTTOM OF THE SEA

During the **Paleozoic** era the region surrounding the Middle Buttes was under the sea. Fine sediments were raining down onto the ocean floor continuously during this period of time. Dry land was apparently a considerable distance away.

In **Mesozoic** era which followed, this part of the submerged earth's crust began to experience some activity. Beginning in the **Jurassic** period, the largest **batholith** of the time in the United States was emplaced—the Sierra Nevada. Some 80-miles wide and 400-miles long, the embryonic mountain range slowly began to rise above sea level.

During the subsequent **Tertiary** period, an east dipping **normal fault** developed along the east side of the batholith. The Sierra Nevada Mountains tilted west from this fault as they continued to rise. The San Andreas and Garlock faults also became active. Although the Middle Buttes had not yet been formed, the area was above sea level and contained large shallow lakes which were surrounded with verdant fields and woodlands. Animal life abounded throughout the region as herds of small horses and barely taller camels plodded across the landscape. It was not, however, Eden.

Below the Middle Buttes region a **magma** chamber was moving up through the earth's crust. It became the source of intermittent volcanic activity that began during the **Miocene** epoch and continued into the **Pliocene**. Pressures within the crust began to rise as the magma ate

When the crust could no longer contain the pressure, they failed and volcanic eruptions burst through to the surface and into the atmosphere. Sometimes these eruptions were violent and explosive. Earlier rocks were broken into **pyroclastic** fragments that were literally blasted across large areas of the surface. From time to time **ash** and **lava** flows added their debris to the surface collection.

This removal of molten rock and gasses from the magma chamber gradually reduced the pressure to a point where crust could no longer support itself. The crust above then collapsed into this zone along concentric fractures that developed above and around the chamber. A **caldera** was formed.

ORE DEPOSIT GENESIS

Magma chambers contain very erosive and reactive components in the form of **hydrothermal** solutions and gasses. It is primarily the hydrothermal solutions which contain dissolved metals. These very mobile constituents rise into the crust along fractures where veins are formed. As these solutions contact the surrounding rocks the mineralogy changes as chemical reactions occur. A common by-product of this activity is quartz. While fluid it circulates within the rock fractures until the temperature and pressures drop to the point where it "freezes" in

place, forming a quartz vein. Along with it are encapsulated any other minerals which have crystallized from the solution.

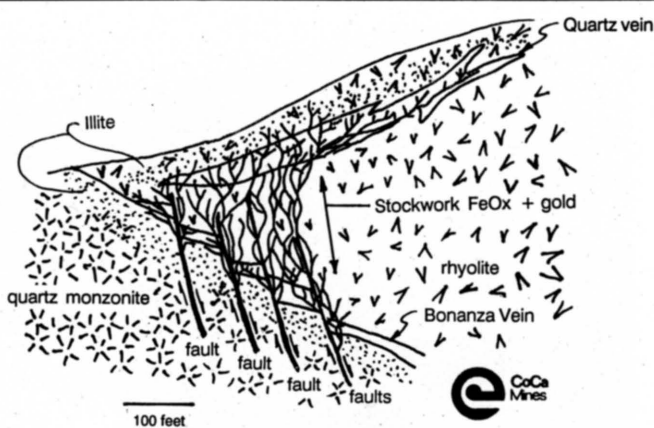
It would appear that the Bonanza Vein of the Cactus Queen and Shumake deposits was formed first along the contact between the volcanic and **granitic basement** rocks.

Subsequent to the formation of the caldera, collapse faults broke through and dislocated the Bonanza Vein and shattered the rocks above. Hydrothermal solutions entering these conduits, moved through the footwall, the vein and permeated the fractures above. It was here that the ore minerals were precipitated, forming the deposits known as the Silver Prince and Shumake. Similar activity created the smaller Winkler and other related ore deposits of Middle Buttes.

THE CACTUS ORE DEPOSITS

The Middle Buttes are the remains of an old volcano consisting of rising ridges and peaks forming body of rock rising over 400 feet above the surrounding Mojave Desert floor to an elevation of 3443 feet. The exposed country rocks which form the base of Middle Buttes are a quartz monzonite associated with the creation of the Sierra Nevada Mountains. It is a basement rock of Cretaceous age which has been intruded by Miocene rhyolites. In addition the quartz monzonite basement rock was intruded and overlain by lavas and pyroclastic flows.

A small 10-mile diameter collapsed caldera is suggested by both the concentric ring-fractures that exist in the area and the relative positions along an assumed perimeter by the Middle Buttes, Soledad Tropico and Willow Springs Mountain and



SHUMAKE DEPOSIT

(Looking northeast)

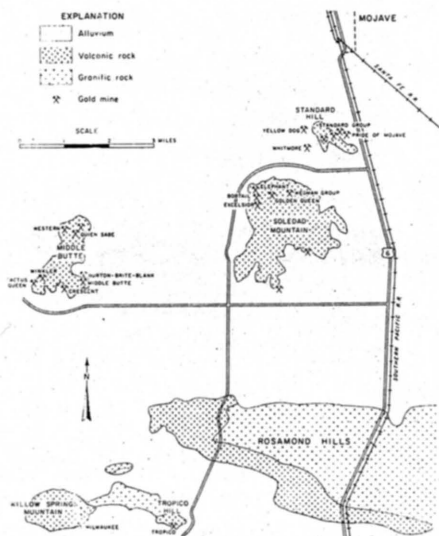
Standard Hill; all the sites of gold ore deposits.

The ore found at the Cactus mine is located within a series of northeast-trending fault zones which parallel the major Garlock fault system several miles to the north. The western-most of these forms the **contact** between the quartz monzonite and volcanic rocks. Along its northeast trending strike are found the Cactus Vein, Shumake and Silver Prince deposits. Ore is also found on parallel faults. Northwest-trending faults which cross these primary structures have formed **breccia** zones which were invaded by mineral-bearing solutions.

The volcanic rocks which overlie and intrude the quartz monzonite basement rock are chemically similar but texturally different, reflecting conditions existing during their emplacement. The volcanic rocks represented range from rhyolite to quartz latite in composition.

In the central and eastern portion of the property the quartz monzonite is intruded by a coarse-grained rhyolite overlain by an ash-flow **tuff** which in turn is overlain with flow-banded rhyolite. The rock most closely associated with the ore deposits is a quartz-eye rhyolite, so called because it contains **vuggy** aggregations of coarse quartz which looks like an eye-hence the term.

The ore deposits are structurally controlled **epithermal** deposits. Gold is commonly associated with the rhyolite intrusions. The mineralization is found in veins,



General geology (after Clark, CDMG).



The Winkler Mine heap leach operation.

shoots and in haloes around these structures.

The gold in these deposits exists as small five-micron-sized particles of free gold and electrum. In the Shumake deposit the ratio of gold to silver is 1:6. The gold is disseminated through the clays where the sulfides have oxidized and in the Cactus Vein and Shumake deposits with quartz and pyrite.

The precious metals are associated primarily with pyrite. In addition to native gold and electrum, arsenopyrite and the silver minerals: argentite/ stromeyerite and proustite/ pyrargyrite.

Alteration of wall rocks by ascending hydrothermal solutions was strong but variable from deposit to deposit. The major types of alteration minerals formed by this activity are sericite ($\text{KAl}_3\text{Si}_3\text{O}_{10}(\text{OH})_2$)/ quartz/ adularia (KAlSi_3O_8) and quartz/ alunite with associated argillization, silicification and subsequent oxidation.

Iron-stained and alteration clays associated with the deposits are also present. Alteration is of the acid-sulfate and quartz/ alunite and kaolin types. This alteration is dominantly found in the hanging wall of the deposits. Quartz/ adularia/ sericite is typical of the Shumake deposits hanging wall.

Argillic alteration is uniquely found underneath the deposit rather than on top of it as would normally be the case. In 1979 CoCa Mines, Inc., began reconnaissance and land acquisition of the present holding of approximately 1500 acres on the

Middle Buttes. Exploration revealed a number of small ore deposits and potential targets in the Buttes.

A joint venture was ar-

ranged with the MinVen Gold Corporation, Inc. for a 25% interest. [The CoCa name is not a result of combining the abbreviations of Colorado (CoCa headquarters) and California (the mine location). The CoCa name was formed from the first two letters of the company principals' surnames: T.E. Congdon and W. Carey.]

The Cactus Mine

The Cactus Mine required capital expenditures of \$16,300,000. The Cactus Mine presently employs 78 people. The mining contractor, Brown and Root, employs an additional 20. The annual payroll is \$2,200,00.

All of the pits and 67% of the pad being located on private property and the remainder on the public lands required working with two different agencies. Permits to operate were therefore required from both the county and the Bureau of Land Management (BLM).

The Winkler

Operations were begun in 1986 at the Winkler Mine (Middle Buttes) deposit located on the east side of the Buttes. This deposit, although small, contained 200,000 tons of high-grade ore:

0.2 ounces per ton. It was mined-out in September of its first year of operation.

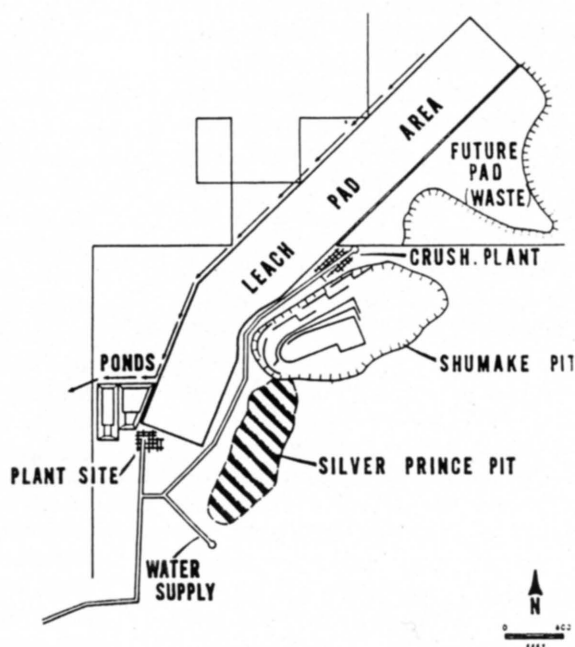
Except for the Shumake ore deposit, the other ore deposits are considered small. Therefore, they were mined out at rapid rates. The last of the deposits associated with the Winkler Mine on the east side of the Buttes were completed in 1989. The heap leach system has continued to operate however, since gold recovery still continues. Some 18 months after mining has ceased five ounces of gold per day is still being recovered.

Cactus Mine Ore Bodies

Ore Body	Tons	opt*	mined out
Winkler	200,000	0.200	6/86
Ella	392,000	0.046	10/87
Trent	780,000	0.042	9/88
Shumake	6,168,000	0.037	11/91**
SilverPrince	932,000	0.029	3/91
Alunite	853,000	0.037	11/89
Winkler	473,000	0.042	11/90

* ounces per ton. ** estimated

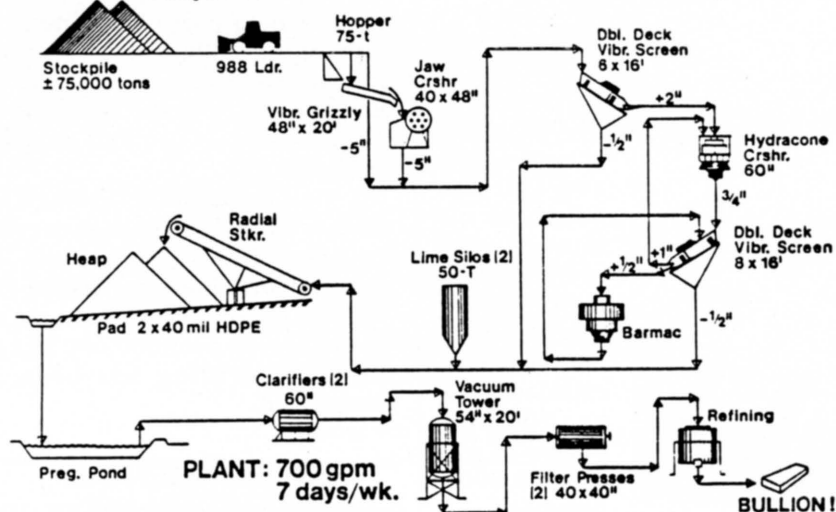
Concurrent with the development and operation of the smaller ore bodies the Shumake deposit was ex-



The Cactus Mine site plan. (CoCa Mines).

MINING: 7500 TPD
4 days/wk.

CRUSHING: 4200 TPD
7 days/wk.



The Cactus Mine flowsheet (CoCa Mines).

plored. The Shumake was ultimately found to contain 6,168,000 tons of **low-grade** ore with 0.037 ounces of gold per ton. The Shumake facility began operations on November 16, 1988.

The Shumake

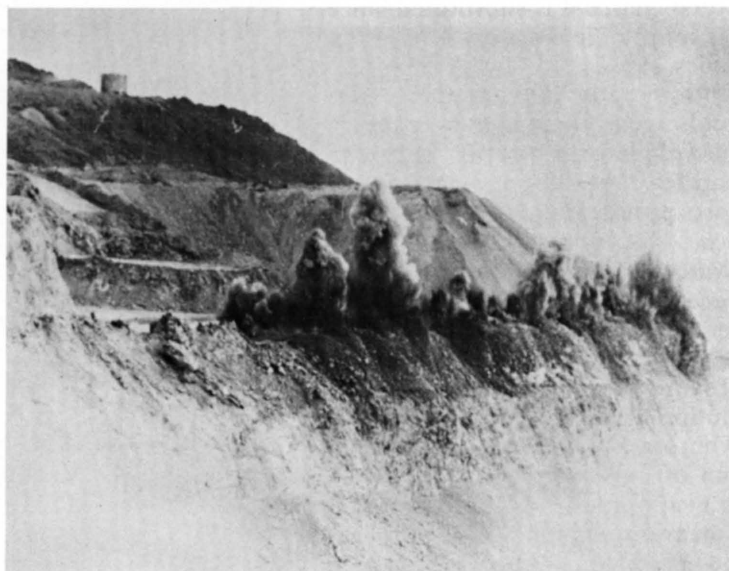
Open pits are used to recover the ore. Benches are 80 feet high with a 32 feet wide catch-bench; the slope angle of about 55°. The Shumake pit is approximately 300 feet deep. Above this point ore is quarried off the west face of the mountain. The waste to ore ratio is 2:1. Since the

Shumake made it a short haul for some of the waste. For this reason Shumake waste is selectively dumped into the Silver Prince pit. Depending on the material being blasted, blast-holes are drilled on a 12-19 foot grid. Blast holes are drilled to a depth of 22 feet. The six-inch diameter holes are then loaded with 150 pounds of ANFO (ammonium nitrate and fuel oil). Normally 80-100 holes are drilled which uses 12,000-15,000 pounds of explosives. The blasted ore is loaded onto 50-ton trucks by front-end loaders and is then transported to the crushers. Waste is either hauled to the waste dump to the north or to the Silver Prince pit, depending on proximity to point of origin.



Shumake pit, preparing the blast.

The ore from the Shumake is crushed to an optimum sizes of 1/2". A 42-inch jaw crusher crushes **mine-run** material which is then fed over a 6 x 16 foot double-deck screen and then to a 45-inch hydracone crusher.



300 holes, 45,000 pounds of explosives. Going, going...

Production capacity was designed for a maximum of 4000 tons per but its capacity has been increased to 6500 tons per day. Production occurs seven days per week. Mining occurs during two shifts per day; leaching and mill recovery occur around the clock.

The Cactus **leach pad** is 600 feet wide and one mile long. Crushed ore is placed on the pad by conveyors and radial-stackers in four 20-foot lifts to a height of 80 feet. For pH control lime is added at the rate of three to five pounds per ton of ore to keep the pH at 10.5. A cyanide solution of 0.5 pounds per ton of NaCN is then applied to the heaps. Initially wobblers were used but a conversion was made to the more efficient drip irrigation emitters. The cyanide solution dissolves both the gold and silver as it percolates through the heap. A recovery rate of approximately 70% is achieved in 180+ days of leaching. When completely loaded, the leach pad will contain over 6,000,000 tons of ore.

The heap of crushed ore rests on a double liner base of 40 mil high density polyethylene (HDPE) plastic. A sand filling of 12 inches occupies the space between the pad liners. The exposed sides of the pad drains the pregnant solution into ditches which conduct the solution to the pregnant pond through 10-inch pipes. The exposed posed pad perimeter and ditches are made of 60 mil HDPE.



... gone! Result: 50,000 tons of ore.

day during the summer. The Cactus Mine has produced on average, 60,000 ounces of gold and 250,000 ounces of silver every year of operation. Total production by closure is estimated to be 260,000 ounces of gold and 850,000 ounces of silver.

Buttons!

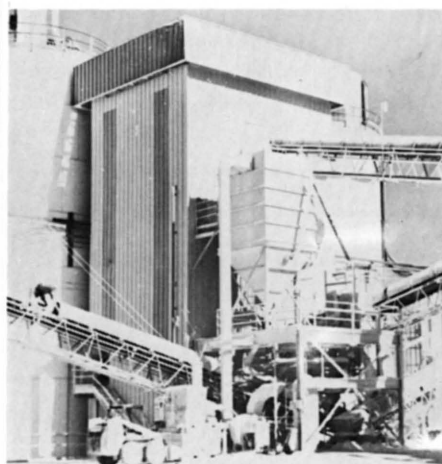
From the pregnant pond the solution circulates through a recovery system utilizing the Merrill-Crowe process. This process uses zinc dust to precipitate the precious metals from solution. When fully charged with precious metals the zinc compounds are smelted. The molten metals are cast in the typical conical molds where the more dense gold and silver settle out to form 500 ounce **doré** cones which are affectionately called "buttons."

The Merrill-Crowe process is used because of the high silver to gold ratio. As the recovery decreases, activated charcoal is substituted since it is more efficient with decreasing grades.

Both the pregnant and the barren ponds were designed to contain 100-year storm runoff from the heap leach pads. Total capacity of these ponds is 5,000,000 gallons each.

Water for the mine and heap leach process is obtained from two 450 feet deep wells. They each produce 400 gallons per minute (gpm). The recovery plant circulates 800 gpm of solution through its system.

The leach system requires 2000 gpm of make-up water to account for evaporation loss. Being located in an arid region increases evaporation losses to 100,000 gallons per



Crusher baghouse.

EXPLORATION

An ongoing part of a mine is the exploration drilling of the property. This is accomplished to better understand the factors controlling the emplacement of ore and to search for more ore.

At the Cactus Mine, oxidized ore extends from the surface to over 300 feet below the surface. Typically, exploration drill holes are drilled 150-350 feet below the surface. At the Cactus Queen over 200,000 feet (39 miles) of drilling has been accomplished.

ENVIRONMENTAL MITIGATION and RECLAMATION

At the Cactus operations great care has been taken to minimize environmental impacts.

The leach pads are double-lined with a leak detection system placed between the liners. In case of a leak it can be identified and the leakage contained. In addition, a quarterly geophysical survey tests the ground below the leach pad to ensure no leakage has occurred in the second liner. Further steps are taken to ensure there is no ground water contamination by taking and analyzing water samples quarterly.

The **pregnant** and **barren** solution ponds do present some hazard to



Radial-stackers loading heap leach pad.



Pregnant and barren solution ponds.

Large yellow eyes...

wildlife, primarily birds. Hazing techniques have been very successful in keeping birds away from the ponds. These measures include the use of electronic bird distress calls, the inflatable owls and snakes commonly seen at nurseries and big (24"-diameter) black balloons with large yellow eyes painted around their perimeters. If any wildlife deaths occur they are reported to the Bureau of Land Management.

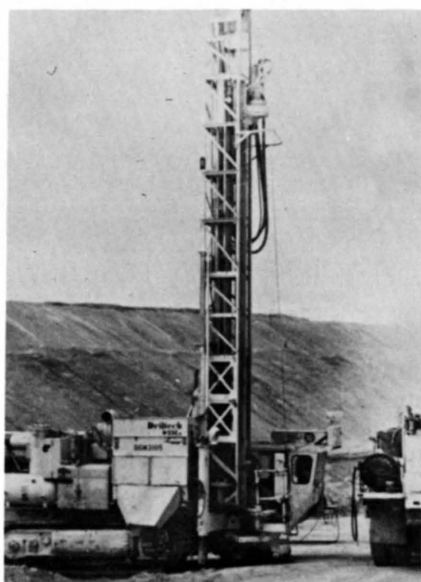
Dust control is maintained by two 5000-gallon water trucks which operate in the pits and on the roadways. At the crusher there are water sprays used in addition to three baghouse-type dust collectors.

There are reclamation plans which cover the Middle Buttes and Shumake operations. The leached ore will be detoxified and contourgraded to match the local topography. Topsoil will be spread over disturbed areas and then seeded.

The future

The CoCa Mines, Inc. is expected to merge with the Hecla Mining Company in June, 1991.

Accessible reserves in the Shumake deposit will become exhausted by December, 1991. Current projections indicate mining operations will be completed in October/November. Crushing of this ore will be completed in January, 1992. Leaching of the heaps will continue at least through 1992.



Drilling for dollars.



50-ton truck at the Cactus Mine.

Drilling beyond the depths attained in the underground workings of the Cactus Queen has indicated ore in quantities that may lead to reopening of underground operations. It is also possible that the discovery is of what may be the central feeder pipe of mineralizing solutions to the known ore deposits. If the hypothesis proves true, the miner's dream may come to pass: the Mother Lode of Middle Buttes may have been found.

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PERSPECTIVE

Is Mining Paying Its Way?

In the first comprehensive study of the economics of mineral production in the California Desert, Dr. Anderson considered the effects of Senator Cranston's so-called Desert Protection Act (SB 21) would have on the economy of Southern California. In this abridged article from her much larger work, she discusses the societal demands and impact on six of the 25 minerals produced in the California Desert. We see herein the scope and the substantial contributions in jobs and taxes the mining industry provides the state's economy while meeting society's mineral needs. Vocal preservation groups have launched a major campaign to discredit the industry. In their bias they misinform the public about industry income while ignoring their own [see pp. 58 & 59].

Dr. SHIRLEY C. ANDERSON School of Business Administration & Economics, California State University, Northridge, CA 91330

The California desert is one of the most important mineral repositories in the world. Currently over \$1.3 billion of minerals are produced from the desert annually, from over 25 different minerals. The importance of desert minerals to California's economy is demonstrated by descriptions of the current uses and trends in cement, boron, rare-earth minerals, saline minerals, gypsum, and gold.

The California desert mining industry directly employs 16,640 people in the five-county area of Imperial, Inyo, Kern, Riverside, and San Bernardino. It employs 19,630 people in Southern California.

Each \$1 million of mineral production accounts for 15.1 jobs!

Mining jobs affect the region directly and indirectly. Direct effects include providing mining wages,



mining equipment, sales, transportation, and other services sold to the mining industry. Indirect effects include wages and salaries in industries in which mining products are used to manufacture other goods and services.

Each \$1 million in mineral production (current desert production is \$1.3 billion) directly accounts for 12.8 jobs in the five-county area and 15.1 jobs in the greater Southern California region.

Value added, which reflects direct effects on regional employment and the production of materials, equipment, and services supported by that employment, accounts for \$754,799 per \$1 million production in the five-county region (\$981.2 million total) and \$898,422 per \$1 million production in the Southern California area (\$1.1 billion total).

Within the five-county region, every \$1 million of mineral production annually accounts for \$26,439.04 (\$34.3 million total) in local taxes and \$41,877.18 (\$54.4 million total) in state taxes. For the greater Southern California region,

each \$1 million in production accounts for \$28,854.39 (\$37.5 million total) in local taxes and \$47,182.85 (\$61.3 million total) in state taxes.

Desert Mining accounts for \$98,800,000 in Taxes

Precluding resource development from this mineral rich area, as would occur under the California Desert Protection Act, is not necessary. Mining companies are able to meet and exceed stringent environmental regulations in order to produce materials needed by our society, while providing a strong economic base to the desert region.

California Desert Minerals

The California desert represents one of the most important mineral repositories in the world. At least 40 different mineral products have been produced in the past from the area, and no less than 25 distinct mineral commodities valued at over \$1.3 billion have been produced from

there in 1988. Some of these, namely the boron minerals and rare-earth elements, serve a global market and hence are of world-wide importance. Products such as cement, clay, and stone produced from the desert play a direct role in the economy of Southern California. They are especially vital to the construction industry because their delivered price to the construction site is largely dependent upon haulage distances from the mine. Other commodities such as **pumice**, gypsum and the various magnesium, potassium and sodium bearing minerals are of great importance to other segments of the California economy such as agriculture, manufacturing, building, and fabrication industries.

Changing technology, shifts in demands for specific mineral commodities, and commodity pricing all play a role in what minerals are produced from the desert. Consequently, mineral resource production is both dynamic and responsive to events as they take place at the local, national, and international level.

To illustrate the varied role of desert mineral production, we will examine a few of these minerals to provide insights into their importance.

Cement

In 1986 California produced 9.8 million tons of cement valued at \$622.9 million. Approximately 70 percent of this production, with an estimated value of \$436 million, represented cement produced from the western margin of the desert. Production and processing sites are located west of Mojave in Kern County, in Lucerne Valley and Victorville in San Bernardino County, and in western Riverside County, near Colton. About seven million tons of cement are produced in a typical year from these locales. A major part of it is used in Southern California where it goes into construction of buildings, homes, highways, and a host of other infrastruc-

ture needs. California cement production has grown with California population, although affected also by economic variables such as the interest rate and government construction spending.

Per Capita U.S. Cement Consumption: 710 pounds.

Historical data show the national annual consumption of cement is about 710 pounds per person. In California this figure is slightly higher, amounting to approximately 720 pounds per capita.

CALIFORNIA POPULATION & CEMENT PRODUCTION GROWTH, 1976-86

Year	Population	Production*
1976	21,653,000	7,896,000
1977	22,075,000	9,271,000
1978	22,566,000	8,989,000
1979	22,991,000	9,724,000
1980	23,509,000	8,797,000
1981	23,991,000	8,302,000
1982	24,495,000	6,464,000
1983	25,021,000	7,567,000
1984	25,482,000	8,715,000
1985	26,055,000	9,462,000
1986	26,675,000	9,800,000

* short tons



Cement produced in California is very competitive with that shipped in from outside the United States, notwithstanding the fact that major cement production occurs within a hundred miles of the greater Los Angeles area, where over 50 percent of California's population resides.

Given the fact that in recent years cement has sold for about \$50 per ton, if an additional 100 mile haulage is added, it would increase the delivered cost \$7.00 per ton, based upon a 7 cents per ton-mile haulage cost. Thus it is clear that haulage cost has an important impact on the delivered cost of cement and hence represents a *major* factor in determining a producer's ability to compete with foreign sources.

U.S. CEMENT EXPORTS, IMPORTS & CONSUMPTION (1000 short tons).

Year	Prod.	Imp.	Exp.	Cons.
1983	70,420	4,721	118	73,435
1984	77,700	8,689	80	84,113
1985	77,895	14,120	98	87,456
1986	78,786	16,128	59	91,501
1987	78,300	18,000	60	93,000

In recent years there have been two disturbing trends that affect the U.S. cement industry, namely a sharp increase in foreign ownership of U.S. operations and a measurable increase of importation of cement materials into the United States. California, being a coastal state, has felt the full impact of these trends.

The following table gives an idea of how pervasively importation has penetrated the U.S. cement market. If this trend of foreign entry into the domestic market continues, we can expect to see profits from domestic operations dwindle and the possibility later of foreign cartels forming and driving the price of cement upward. This would have a severe impact upon the costs of housing and the construction of public works, resulting in higher taxation to pay for public facilities that are built and an increase in the cost of new home construction. It is difficult to determine the total effect this would have on workers and truck drivers who are involved in cement production and delivery. However, it is safe to assume it would have a measurably negative impact. In the desert area, it is estimated ap-

proximately 750 people earn their livelihood directly from cement production, and 400 more are employed in transportation of this material.

Boron

California is the world's leading producer of boron minerals. Over 650,000 tons of boron oxide (B_2O_3) valued at \$430 million is produced yearly in California. Production sites are located near the town of

Boron in eastern Kern County, at Searles Lake near Trona, and in the Death Valley area in Inyo County. The biggest industrial user is the glass industry, especially in the production of fiber glass. Other major uses include metallurgical applications, fertilizers, herbicides, detergents, cosmetics, manufacturing of aircraft and automobiles, and a myriad of others.

It is estimated about 10 percent (65,000 tons) of boron oxide-bearing material produced in the desert is consumed in California and 40 percent (260,000 tons) in the United States, with the remaining 50 percent (325,000 tons) entering the world market. The only major competing boron production comes from Turkey with which U.S. producers compete on the world market. The boron industry in California provides direct employment for about 2000 people at mining and processing plants in the desert and at shipping facilities in the Los Angeles harbor area.

There are other known boron deposits in the California desert of probable commercial value which could be brought into production. However, if the CDPA were to be enacted, it is likely these deposits would no longer be a supply source of boron minerals.

Rare-Earth Minerals

Rare-earth (lanthanide) mineral production is a comparative "new comer" to the California mining

scene, having only started a few years after the close of World War II. A "world class" rare-earth metal deposit is located at the Mountain Pass area near the Nevada border. Elsewhere in the desert, other rare-earth element deposits are known. These mineral sites are situated in areas slated for National Park and Wilderness status under the CDPA.

Production from the Mountain Pass deposit during 1987 yielded 18,000 tons of **bastnasite**, the host mineral for the rare-earth elements. Bastnasite was separated into concentrates and hi-purity compounds including **cerium, lanthanum, yttrium, europium, samarium, neodymium, and gadolinium** valued at around sixty million dol



lars in 1987. The material produced serves a global market where it is employed in a wide variety of applications which include surgery, communications, cutting organic and ceramic materials, fiber optics, photography, and space exploration.

The recent development of superconducting materials for transmission of electric power and very high intensive strength "super-magnets" have resulted in a global interest in rare-earth elements. Because of the great promise such products have in reducing energy losses in transmission of power and in being able to downsize equipment that uses magnets, there is potentially an explosive demand for the rare-earth elements that could well result in new "high technology" companies locating in California.

Saline Minerals

The **saline** minerals are produced from dry lake areas situated in the desert. They include calcium chloride, magnesium compounds, potassium salts, sodium carbonate, and sodium sulfate with an annual production valued at several 10's of millions of dollars.

Major uses of the saline mineral products include manufacturing of glass, rayon, soap, detergents, fertilizer, and for water treatment.

Searles Lake, situated near the town of Trona in Inyo County, is the major source of saline minerals produced in California. Elsewhere in the desert similar deposits are known to occur in other dry lake areas; some of which have yielded production in past years. Passage of the CDPA would likely preclude some of these from becoming productive.

Over 1000 people in California are directly dependent upon production of saline mineral products for their livelihood. In addition, an undetermined number of truck drivers and railroad employees are involved in transporting the materials to the market place.

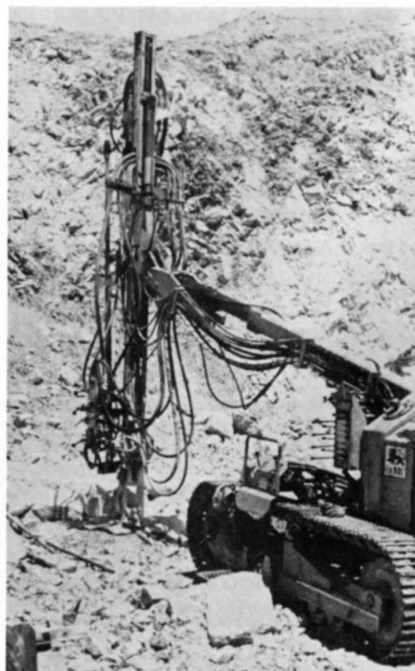
Gypsum

California is the second largest producer of gypsum in the United States. By far the bulk of California production comes from the desert. Elsewhere in the desert there are known large deposits of gypsum that are not in production at this time. Passage of the CDPA would preclude mining of these deposits. Gypsum is used as a vital ingredient for making cement, plaster, wall-board, stucco, molding, and casting plaster. It is used in agriculture for soil conditioning, stimulating soil microorganisms, and as an ingredient in animal feed. Annual consumption of gypsum in the United States is about 200 pounds per person.

Per capita U.S. Gypsum Consumption: 200 pounds

Notwithstanding, the fact that California is the number two producer of gypsum in the United States, 5 out of 7 of the calcining and manufacturing plants located in the state imported gypsum. In 1986 the estimated production of gypsum in California amounted to 1,474,000 tons, valued at over \$50 million.

Most of the gypsum and gypsum products produced in California are used within the state. It is estimated



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about 1000 people earn their livelihood in the mining, processing, storage and shipment of gypsum and gypsum-based products.

Gold

The upsurge in gold production from the California desert has been dramatic. Just 6 years ago the entire state produced only 10 thousand ounces of gold annually, whereas in 1987 estimated production from the desert alone amount to 260,000 ounces valued at \$120 million. Important production is realized from mines located in Imperial, San Bernardino, and Kern Counties. Approximately 300 people earn their livelihood from gold mining activity in the desert, over 200 in Imperial County alone. This has been particularly welcomed in Imperial County where the 1987 unemployment of 7,700 was 19 percent of the county labor force—the highest unemployment rate of any county in California!

A number of new gold deposits in the desert area are being planned for production. One of particular note is the Castle Mountain deposit located in eastern San Bernardino County. It is considered a "world class" gold deposit in which about two million ounces of gold have been established, and this figure is

expected to increase with continued exploratory drilling on the property. Annual production of 100,000 ounces of gold is projected, which would be valued at about \$40 million at the current price of gold. It is anticipated that this mine would require about one hundred employees. The deposit is situated within the East Mojave National Park proposed by the CDPA, and as a result it is problematic whether it could be brought into production if the CDPA were enacted.

New Gold: 75,000 ounces

Based upon the favorable geologic environment for occurrence of significant gold deposits in the California desert, it is anticipated that at least 75,000 ounces of new gold output each year will be added to production from the desert over the next decade provided the desert area as it is known today remains open to mineral entry. In conclusion, gold production from the desert represents a major growth industry, and the benefits from this activity will extend throughout the state in general, and especially in Southern California, provided there are no legislative mandates to curtail exploration and development of this mineral resource.

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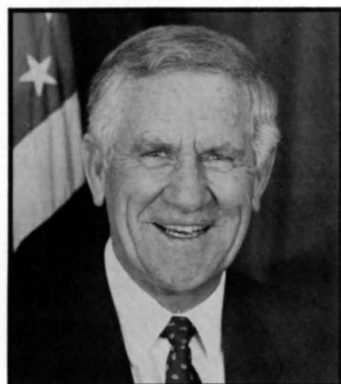


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ENVIRONMENTAL POWER

ENVIRONMENTAL GREEN: \$\$\$\$\$\$\$\$\$\$



by William E. Dannemeyer
Congressman 29th District, California

The 12 major environmental groups in this country have financial resources almost four times that of the two major political parties. They form what Congressman Dannemeyer calls the EP. Their adverse impacts in what can be described as a cultural war are noted in four areas of American life in this article excerpted from a press release issued by the Congressman's office.

Many liberal pundits demanding an emasculation of our national defenses in the wake of changes in Eastern Europe are now struck with the reality that the Cold War is not over, it has simply moved to the Third World.

Ironically, these same creators of "conventional wisdom" are having to rethink our commitment to energy independence as they face the reality of an increasingly unstable Middle East as juxtaposed to risking the lives of young Americans defending Japanese and Western European oil flowing from the Persian Gulf.

The greatest enemy for the United States has always been the enemy from within -- those who would sacrifice American independence on the altar of global interdependence. No foreign enemy could threaten our national security more than we have done to ourselves by keeping us mostly dependent on foreign sources of energy.

The enemy in this case is a group of powerful special interests I refer to as the "Environmental Party," or the EP. I describe them as a political party because of the massive monetary and grassroots resources they have managed to tap across this country.

Data from the Federal Elections Commission (FEC) reveal that the three main Republican bodies took in contributions of \$71,100,000 in calendar year 1989. The three main Democrat organizations took in \$18,600,000 in the same year.

All told, both parties took in \$89,700,000. Now consider the EP.

Twelve Groups Form The EP

Twelve organizations comprise the base of support for the EP: Center for Marine Conservation, Clean Water Action Project, Environmental Defense Fund, Greenpeace, USA, National Audubon Society, National Wildlife

Federation, Natural Resources Defense Council, The Nature Conservancy, Public Interest Research Group, Sierra Club, The Wilderness Society, and World Wildlife Fund.

All told, the EP has an operating budget of \$336,300,000 (1988). That's nearly \$250,000,000 more than the Republican and Democrat parties combined.

1989 Contributions

Democrats*	\$18,600,000
Republicans*	\$71,100,000
Environmental**	\$336,300,000

* Three major groups.

** Twelve major groups.

The EP is an awesome new dimension in American politics. They are a much bigger security threat than Saddam Hussein could ever hope to be. The EP's path of destruction has come in four general areas: nuclear power, offshore oil drilling, the Arctic National Wildlife Refuge (ANWR), and the Endangered Species Act.

Nuclear Power

The average time it takes to build a nuclear power plant in the United States is 14 years. The average cost is \$3 billion. France can build a plant in just under five years and at a cost of one billion dollars, less than half the time and a third of the cost as the United States. What is the difference?

The difference is the EP. Countries such as France and Japan have a one-step licensing process for all proposed nuclear plants. The United States has a two-step process thanks to the EP. Their thinking is that the longer they can successfully draw out the construction process, the more cost prohibitive the project will become. By driving up the costs of nuclear power, oil and coal are given a market advantage.

Offshore Oil

One of the greatest ironies manifest by the EP is their zealous concern for oil shipped by tankers combined with their adamancy against offshore oil. Almost every last drop of imported oil comes to us by tankers like the Exxon Valdez, and yet the EP refuses to promote safe and ecologically sound offshore oil expansion as a matter of environmental policy.

The EP-induced moratorium on the sale of offshore leases affects billions of barrels of oil. Three basin areas

(Santa Cruz, Bodega Bay, and Point Arena) beneath the waters off the coast of California contain some of the nation's last remaining, and most promising, oil and gas prospects, estimated at between 2.5 and 5 billion barrels of oil. The twenty three platforms containing 692 operating wells in federal waters and the 14 platforms containing 1,337 operating wells in state waters produced 87,000 barrels of oil per day in 1988.

The current estimate of undiscovered oil reserves beneath and entire federal Outer Continental Shelf (OCS) is about 18 billion barrels of oil and 145 trillion cubic feet of natural gas, or approximately one-third of all the recoverable oil and gas remaining to be discovered in the United States.

I would much rather explain to a parent why we have offshore drilling expanding off our coasts than I would to explain why we sent their child to a foreign land to defend oil largely consumed by Japan and Western Europe. Oddly, the EP would rather have us send our kids to be killed defending oil shipped by tankers which they view as an environmental threat.

Arctic National Wildlife Refuge

The Arctic National Wildlife Refuge is comprised of almost 19,000,000 acres in northeast Alaska. A 1,500,000 acre tract known as the Coastal Plain, less than one percent of the total area of ANWR, is where substantial oil and gas reserves are located. Geological surveys and seismic exploration of ANWR indicate that the area


contains between 4.8 and 29.5 billion barrels of oil and 31.1 trillion cubic feet of natural gas. The EP wants this acreage locked up from energy development and, so far, they have been successful.

Endangered Species Act

Nineteen seventy-three was a watershed year. Congress voted to adopt a policy that would effectively protect a number of wildlife under the provisions of the Endangered Species Act and, in the same year, the Supreme court issued the Roe v. Wade decision allowing men and women to kill the unborn.

We have become a society, moved greatly by the EP, that worships the creation more than the Creator. The EP sides with those who say that it is okay to slaughter one and a half million unborn humans every year, but that it is not tolerable to kill one fish or critter.

We have seen what the snaildarter can do to public policy. Now we will witness what the Stevens kangaroo rat, the spotted owl, the gnatcatcher bird, and the least Bell's Vireo (it's a bird) will do.

The EP is a major enemy from within. Saddam Hussein is a marginal threat to the United States compared to the Environmental Party. We are being held hostage by extremists. They leave no room to negotiate. It is time for Americans to rise up and regain our national security. We should demand energy independence. To do so will save the lives of young Americans fighting for causes for which they have little interest. 

ENVIRONMENTAL POWER

\$IERRA GREEN

The Sierra Club is one of the 12 environmental organizations listed by Congressman Dannemeyer which compose the group he calls collectively the EP. It is well known for its image as an outdoorsy and environmentally active organization. How are they doing financially?

1990 Income: \$40,659,100!

Earth day gave many organizations increased visibility and boosted memberships. The Sierra Club gained over 80,000 new members. This represents a 15% increase over 1989 to a membership numbering 630,000. Their total revenues grew by 9% to \$40,659,100—over twice that income received by the Democratic Party in 1989. Membership dues accounted for \$15,144,600 (37% of income). Contributions and grants amounted to \$12,764,000 (19%). Outings (approximately 295 trips) and lodge income amounted to \$2,643,300. Income from books sales was \$3,806,800. Advertising and investments garnered \$2,938,400. Another \$1,588,800 was derived from royalties. The value of services from the-

Sierra Club Legal Defense fund were in the amount of \$4,846,300 for legal services provided.

Their Washington D.C. headquarters were purchased in 1988 for \$1,843,300; monthly mortgage payments are \$15,833 (11.3% interest rate).

The largest expenditure of funds was \$10,784,500 (26.5%) for "studying and influencing public policy". The next greatest expenditure was \$8,218,600 (20.2%) for "information and education". Membership servicing required \$6,110,600 (15%); this cost was somewhat higher than normal because preparations were being made for their Centennial Campaign and Celebration. These funds also enhanced the growth of their volunteer development and public affairs offices. Total fund-raising activities required \$4,023,000 (9.9%).

It is interesting to note that only \$2,609,400 (6.4%) was spent by this outdoors organization on outdoor activities.

General and administration costs were \$5,162,600 (12.7%).

The Bottom Line

Total expenditures were \$39,705,800 and income \$40,659,100. A profit of \$ 953,300 realized (down from \$2,060,600 in 1989).

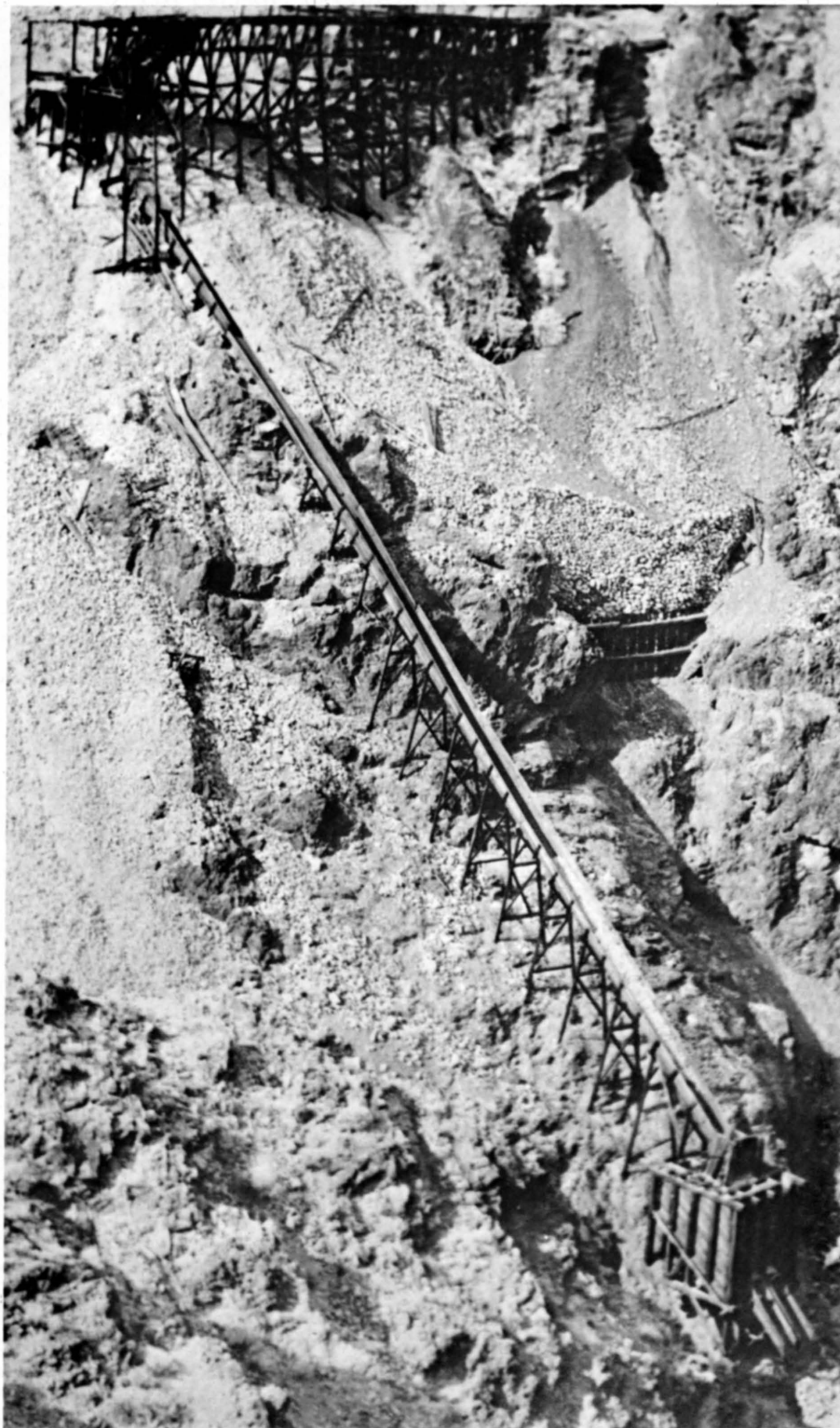
If the Sierra Club was a mine it would be a very rich one; and it is not the largest of the twelve groups.



MINING DISTRICT

Part II

The Sound of Silver: Life in Calico



Ore chute and ore bin, Calico Mining District

By Marion F. Ely II

The first claims in the Calico Mining District were made on New Year's Day, 1881 by Lowery Silver. They were followed by other discoveries in April, but it was not until the latter part of June that the richness of the silver ores were recognized. The rush was on and the population steadily grew into the hundreds. Campsites dotted the hillsides and canyons. Merchants and others soon recognized the potential for a secondary bonanza. A townsite was located on the **alluvial terrace** adjacent to Wall Street Canyon below the Silver King Mine. Named Calico after the mountains around it, by the end of 1882 it became a beehive of activity. In Part I we looked at the geology, ore deposits and mines of the Calico Mining District. Now we look at the people and subsequent events in the life of Calico.

In order to show comparative values, current silver values calculated at \$5.00 per ounce are shown in brackets: [\$].

The Sound of Silver

Day by day men entered the district along with the timbers from Flagstaff, Arizona and supplies from the outside world. Mills were being built, buildings were rising at the mines, and along Calico Street (which later became Main) a town was being formed. To the growl of desert winds forcing their way through the canyons were added the sounds of progress: the roll of wagons, laboring animals, the rap of hammers and rasp of saws, drill-steel being struck with iron hammers and explosions. To this was added a somewhat unique sound — the sound of raw silver.

Due to the steep slopes of Calico Mountains, it was impractical to construct roads to access the mines. Men could walk, **ore** could not. Perched like so many small caves hundreds of feet above the floor of Wall Street Canyon were the mine **portals**. By

trial and error it was found that ore would easily move down a wood-chute set at a 32° slope. Ore bins were built near the bottom of the canyon and thousands of feet of chutes were constructed up and down the mountain side to connect with mine portals.

The first chute to be constructed was at the Silver King Mine north of town. After it was determined that a road would take two-years to build in this steep terrain, a chute was chosen since it was estimated that construction time would be only two-months and cost a third of the road.

Construction began in September, 1882. A horizontal platform would extend from the mouth of the mine's portal to a point 90 feet above the ground. An ore car would be pushed to that point and its contents dumped into the chute. Arriving in the bin at the bottom of the slope the ore would be sorted. Low-grade ore (less than 20-ounces of silver per ton) would be dumped onto a storage pile for future processing. The selected ore was then trammed to the 100-ton ore bin where it was dumped and later put into 20-mule team wagons for transport to the mill [*Headframe, Sept./Oct., p. 21*].

The receiving ore bin was completed and construction of the trestle to hold up the level track extending from the mine's portal started. In October the trestle was 80-feet high when a three-day wind began. Needing "claws like cats", the men tenaciously hung on and continued their work. The chute was then constructed to connect the trestle with the bin. From several hundred feet below, those unconnected with the project began to wager whether or not it would work. A few days before Christmas the chute was completed without fanfare. An ore car with one-half ton of ore was pushed out and its contents dumped into the chute. With a roar like that of a freight-train it thundered down the 200-foot plus chute. In an instant the inhabitants of Calico rushed outside to see what had caused the roar. When they realized they had heard the "sound of silver", a multitude of cheers arose from the throng.

As the details of the construction



The Silver King ore chute and Calico.

were being completed the carmen expressed their desire for a handrail to protect them from the gusty winds. Mr. Barber, the superintendent, thought otherwise. He did however, agree to investigate the matter. He walked out to the end of the trestle and looked down at the town below. After a few moments of looking around he turned around and began walking back. After walking some 20 feet he was caught by a gust of wind and thrown to his knees. Clinging to the rails he scurried back to the portal on all fours in record time. He most heartily agreed to the request for a handrail.

Trestles and their connecting chutes became common throughout the district. As the ore was brought to the surface of the mine, the ore cars dumped their silver loads into the chutes. Trailing a plume of dust, ton by ton the ore rumbled and thundered down the chutes to the waiting bins below. The sound of silver announced the delivery of new wealth to the world and to the growing population of Calico. The clatter and roar reverberating through the canyons gave a vicarious feeling of security to the population of Calico. Noisy as it was, the sound that punctuated the day represented some stability and a promising future. In contrast, silence brought with it a feeling of apprehension.

Life in Calico

The hotels were operated by respectable women; the Pioneer House was the first to open up in Calico and was managed by Mrs. Cook. The Calico house was operated by the owner's three daughters who to their customers were known as Faith, Hope and Charity.

The first religious service in the camp was conducted by Rev. Charles Shelling on October 15, 1882. The service was held in Alfred James' store and drew about 20 people from the community; the men outnumbered the women in attendance by a least three to one. (During the week James' Store held Hercules explosives for the mines.)

In October, 1882 Jordan's new adobe hotel was open for business. Transients paid \$2 per day and regulars \$7 per week. It was located at the upper end of the street and boasted that its furnished rooms were "...away from the noisy saloons". The Hyena House sported an American flag, barrel-stave walls and a wheelbarrow to transport new residents from the stage to the hotel. Its exuberant inmates were bachelors.

The silver community was always looking for politicians that would re-

store silver to its monetary position. The Silver Question was the only political issue in the 1882 state elections that interested the people of Calico. They were somewhat skeptical of politicians who were seen at the mines only before elections. A popular ditty of the time reflecting the handshaking politico ran, "Howdy, howdy, how d'ye do? How is your wife, and how are you? Ah, it fits my fist as no other can, The horny hand of the working Man."

Also of political interest in 1882 was the creation of a new county by merging the desert portions of San Bernardino and Inyo counties, a move which many thought reasonable and in time would come.

PAST TENSE

The Girl with the Calico Dress

*A fig for your upper-ten girls,
With their velvets and satins and laces,
Their diamonds, and rubies and pearls,
Their milliner-made figures and faces,
They may shine at a party or ball,
Emblazoned with one-half they possess,
But give me, in place of them all,
My girl with the Calico Dress*

Visalia Delta April 7, 1864

A Pound of Feathers

As the mines were developed, new and larger ore bodies were found which required more labor. The exuberance that attended these rich ores seemed to know no bounds and higher and higher values were being bandied about. The *Calico Print* reminded the local mining community that silver was worth \$1.05/oz. [\$5.00], \$16.80 a pound [\$8.00], and long ton of silver was worth only \$37,632 [\$176,800]. What he overlooked, however, was that "a pound of feathers is heavier than a pound of gold." Since precious metals are weighed by the troy ounce which is lighter than an avoirdupois ounce, a regular pound would contain only 14.58 ounces and not 16, of silver. So even he was overestimating! There was talk of the railroad coming to

town as the construction east across the desert progressed. It was not until the Waterloo Mine ran a spur to Calico in September, 1891 that the hope was realized, however.

The population continued to grow. It peaked in 1887/88 with an estimated 1000 people residing in the environs of Calico. They were an industrious lot.

In February, 1885, the residents of Calico were considering incorporation. In February the nearly deaf Dr. A. H. Rhea arrived and set up shop. A dentist promised to make an appearance in March while on his circuit. Calico now had two doctors and two attorneys in residence and over 30 gamblers. The two-story Whitfield House was opened. It boasted of its sure-fire, fire escape which consisted of a rope and anchor. The stage left the post office on a regular schedule, twice per day at 11 a.m. and 5 p.m. The "bench sweaters" were always there to note the arrivals and departures on the stage and the occasional "narrow gauge", any single horse-drawn conveyance.

The school was being opened and A.L. Hamilton was arriving to teach the student population of Calico. There were now 20 children in Calico requiring a school.

The Rev. Father Cook conducted Roman Catholic services in town now. Church services were now held in the school house and alternated weekly with protestant services.

There were many cases of pneumonia around, town and many died as a result.

The Calico Literary Society was formed and met in the Town Hall.

Sheriff LeCyr

The measure of a mining camp's level of civilization can be gauged by a variety factors. Among those often mentioned are: the number of men, women, children, schools, homes, religious services, saloons, Chinese, lawmen, jails, gamblers, women of easy virtue, and criminal acts.

Calico had all of these but one—a jail. Those requiring incarceration



Dr. A. H. Rhea, Fannie Mulcahy c. 1887

were taken by stagecoach to the San Bernardino jail. By and large Calico was a civilized, law abiding community. This is not to say Calico was a dull place to live. As the population grew to over 300 people in 1882, so did societal demands and conflicts. Of particular concern to the people of Calico was their image as a town when a murder was falsely reported.

Two men were caught and arrested for stealing ore from the Runover Mine. More serious was the potential arising out of the discovery of some new high-grade ore on unclaimed ground near the Oriental Mine. Two opposing parties had contested the find and had each formed parties of nearly 100 men armed with Winchester rifles, shotguns and small arms. Rock forts had been constructed in the vicinity and tempers were rising. It appeared as



Calico Schoolhouse c. 1887

though open hostilities would begin on the night of February 3, 1885. Deputy Sheriff Joseph LeCyr caught wind of the proceedings and approached the warring parties around midnight. Tensions were high but the men respected the six-foot sheriff. He talked to both sides through the night seeking some resolution. By dawn their respective positions had faded under LeCyr's words and the men slipped away without firing a shot. A potentially catastrophic event had been avoided and had raised LeCyr's esteem in the eyes of his fellow men.

PAST TENSE

KNIGHTS OF THE GREEN CLOTH

"There are over thirty professional gamblers in the town of Calico. "They toil not neither do they spin, yet Solomon in all his glory was not arrayed like one of these" for style, nor pay his board bills with any more regularity. The supposition is that they keep a large number of miners in their employ who earn for them at least enough money to pay their expenses. Say, board, lodging and incidentals per week \$20 which is none too high an estimate. The cost of maintaining thirty then, is \$600 per week or \$2500 per month, or \$30,000 per annum. It is evident that the gamblers are having worked some pretty fair properties even to pay expenses, but it is not surprising that such shrewd men should drop onto the richest leads. If a hospital for the Knights of the green cloth were to be erected in Calico with thirty regular inmates to be supported by a tax upon the district of \$2500 per month would there not be some wailing? Consider the expenditure as made for amusement is it not a somewhat extravagant one? And yet it has been somewhat difficult to raise money to clean Calico and buy closet disinfectants."

Calico Print February 8, 1885

Black-legs

Another problem arose out of the town's growth. Along with the gamblers that arrived in Calico's early days came the "black-legs". Known by the black stockings they

wore, these women populated the dance halls and, as they were euphemistically called by Calicoites, "edifices of social evil". They have been romanticized and scrubbed-up by film and television fare through the years. However, their reality was far from the somewhat glamorized image presented today. These unfortunate women suffered from physical and emotional ills but were tolerated for a variety of reasons. Few had the proverbial "heart-of-gold". Most of them were hard cases. On the streets they wore ankle-length dresses but in the saloons and other establishments they were known for their cigarette smoking, drinking and profane language.

The black-legs knew their social position and located their places of business accordingly on the outskirts of town. A problem arose when the town grew bigger than expected: the houses of ill-repute were now located right in the middle of town.

One of these institutions was called the Calico Dance Hall. It employed two male proprietors and 16 "frail but fair" employees. One Friday night a client was lured away from the bright lights and into the shadows where he became a victim of a deadfall robbery (a trap which has heavy weights attached to it). After recovering from the painful experience he lodged a complaint with Constable Stevens. The result was an arrest of 18 people.

Michael Redman.

Boot and Shoemaker.

— o —

ALL KINDS OF BOOTS AND
SHOES MADE FROM
THE BEST MATERIAL, AT

Reasonable Prices.

CALICO STREET..... CALICO.

Globe Chop House.

G. D. BLASDEL, Proprietor.

THIS NEW, ATTRACTIVE and well-finished eating house is now open to the public. Meals are promptly and tastefully prepared by an experienced cook at all hours of the day, and from the best edibles that the market affords. The proprietor will spare no pains to please all his patrons. Give him a call, and you will find everything conducted in Metropolitan style.

Not to be deterred, the same events recurred several weeks later. This time the keeper and one Kitty Smith demanded a jury trial, two went to jail (which was in San Bernardino) and 12 other complaints were issued against "inmates of houses of prostitution".

PAST TENSE

FIRST CALICO DEATH

J.L. and J.W. King arrived a few days ago from Downey, Los Angeles Co., Cal., and came for the purpose of removing the remains of their father, Samuel L. King, who died at Calico May 23, 1882 and was buried at Fish Ponds. They took his remains away by private conveyance and had them interred in Little Lake cemetery near Downey. The deceased was the first person who died in Calico. J.L. King was one of the Pioneer prospectors of Calico district, and became interested in several mines in East Calico, which he sold after being in camp for about a year, and then left for his present home in the land of orchards and vineyards.

Calico Print March 15, 1885

Life went on in Calico. The Calico Democratic Club had a grand ball in celebration of President Grover Cleveland's inauguration. A new saloon was built and a prize fight for a \$100 purse was held; reserved tickets cost \$1.50. Constable Steven's 6-year old son was knocked down by a mule and had the presence of mind to roll away before the six-inch wide steel tire on the ore wagon could run over him.

Forty children were enrolled in school but only two were never tardy or truant. The state sent \$35.24 for books for the school library. Over 60 books were ordered for the school library with the money the state had sent.

The Calico Literary Society was discussing the issue, "A college education or a trade?" The next meeting of the Calico Literary Society discussed an issue of growing concern, "Silver coinage should not be suspended". Judge Almon edified those gathered there on, "The life and work of Timoleon of Corinth". The school was suffering a truancy

rate 47% with only 35 of the 65 enrolled bothering to attend.

In response to Calico's requests, Wall Street Canyon, Main Street, Oriental and Snow Bird Canyon Roads were declared county roads by the Board of Supervisors.

The Congregational minister Rev. McCunn was taken ill and was unable to cover his circuit which extended from Mojave to the west, through Calico and east to Needles. In his honor a musical and literary program was held in Daggett to raise funds for him; it attracted a standing room only crowd and was judged a success by all.

Mr. Hansen was in town taking photographs during March to record Calico scenes for posterity. A bond issue of \$3000 was being proposed for the school in Calico.

Shooting Scrape?

On April 1, there was talk of a shooting scrape in Kirwin and Flynn's saloon and the body being still there. Interested parties casually strolled into the saloon where they were greeted with "April fool!" when they moved around to view a stuffed dummy.

Articles of incorporation were filed for the Calico Water Company to issue 4000 shares in order to raise \$40,000 for a well south of town and the pipeline and pumps to supply the town. By the middle of April the Calico Water Company's well was down 40 feet; water was expected to be delivered to town in about a month. By the end of April the Calico Water Company's well had reached 92 feet and water. By the end of April the town's well was completed.

Mystery!

In one of the strangest events of the town occurred in the middle of April, 1885. One day the townspeople discovered that the respected H.B. Stevens had left town. He had settled his accounts, raising \$15,000-\$20,000; he deeded his buildings to his wife and his mine to his daughter. He then left town for South America. It was apparently

of a mystery to his family as it was to the town.

PAST TENSE

FATAL ACCIDENT

Last Sunday a fatal accident occurred up at the Washington & Creole shaft whereby Maurice Mulcahy lost his life. Mr. Mulcahy, accompanied by his son John, a boy of about sixteen years of age, on Sunday morning, about 9 o'clock, went up to the Washington & Creole mine, where he was chloriding, to work. They went down the shaft, and on reaching the station, Mulcahy stopped off of the ladder, telling his son not to be afraid, that the trap was down and everything secured, and that he would get a light, taking a step and reaching to the place where he kept his candle. The step was a fatal one, for the trap was up and he stepped into the shaft, falling to the next station, a distance of about 110 feet. His son seeing that his father had fallen down the shaft, commenced yelling for help, and a couple of chloriders working in the mine went to his assistance and down to the next trap, where they found Mulcahy, and although he was bruised, lower limbs paralyzed and fatally injured internally, he was conscious. The boy was sent to town for assistance, which was soon at the place of the accident. Mulcahy recognized every person before him, called them by name and shook hands with many. He said that he knew that his time had come and that he was going to die, for he could feel a stream of blood flowing around inside of him and requested that he not be removed, for he wanted to die there with as little pain as possible. He was rolled in blankets, then tied to planks and carefully hoisted to the top, then conveyed to his residence. He breathed his last at eight minutes past 12 o'clock Sunday night, and his remains were followed to its last resting place by a large cortage of sorrowing friends at 2 o'clock on Tuesday afternoon. Maurice Mulcahy an Australian by birth and was 41 years of age, and has resided in Pioche about eight years. He has lived for a number of years at Sacramento, Folsom and San Francisco, California, and is well known by the early inhabitants of those cities. He leaves a wife and seven children, the oldest being a son of about eighteen years old, and also two brothers, residing in San Francisco.

Pioche Weekly Record March 19, 1881

The population of Los Angeles had now reached the astounding figure of 35,000.

The Widow Mulcahy from Pioche arrived in town with her seven children. The two eldest, 21-year old Ed and 19-year old John went to work in the mines. (Ed later went to work for the *Calico Print* as a reporter.) Their sister, and the future postmistress of Calico, Fannie, was only 15 years old at the time of their arrival. She went to work in W.L.G. Soule's General store. Among the four younger children was 5-year old Maurice—who, except for short forays elsewhere, was destined to spend the rest of his life in the mines of Calico.



The Wonder Dog!

Jack Dorsey?

One of the most interesting events in U.S. Postal history occurred while Fannie Mulcahy was postmistress. The eastern mines of Calico, the Odessa and Bismark group, were about three miles northeast of town. Every day they would send someone down to Calico to get the mail. A dog in the camp would follow the man selected down and back. Always anxious for faster mail service, the situation was discussed one day in the post office. Someone suggested that as smart as the dog seemed to

be they bet he could do the job. After the laughter subsided they decided to try him out. The mail carrier left without the dog. The dog later showed up at the Bismark camp.

A canvass sack and harness was made and fitted, which after some getting used to, the dog readily accepted. The dog would arrive in Calico every morning and cavort with the other dogs of town; but when it was time to get the mail he would arrive at the Post Office. The mail would be placed in the dog back-pack and he would be on his way.

But who was that dog? The only extant photograph of the canine male mail carrier has the name "Dorsey" written on it. In a *Calico Print* article describing the dog's role in service of the U.S. Mail, correspondent Ed Mulcahy spoke of the dog "Jack". Jack, Dorsey or Jack Dorsey, the dog performed an unique role in the history of Calico.

PAST TENSE

AN AFFRAY

In the morning of the 11th instant, a affray occurred in Collins & Poierie's saloon, Calico, James Jordan stabbing Pat Oday in the back with a butcher knife. Jordan was under the influence of liquor and tried to settle an old grudge by carving Oday. He was bound over by Justice Williams to appear before the Superior Court at San Bernardino. Oday received several cuts on the head also, but his injuries, though severe, will not prove fatal. The prisoner was taken to San Bernardino by Deputy Sheriff LeCyr.

Calico Print April 9, 1885

It was duly noted in the *Calico Print* that in 10 days there had been 27 fights in nearby Daggett. E. D. Mulcahy was now the Calico correspondent for the *Calico Print* which had moved to Daggett after losing its office to one of the three fires that swept through Calico.

A May to Remember!

May Day was one of the major social events of the year. A Strawberry Festival and May Day Ball at the

Town Hall were planned. There would be a Maypole and the opportunity to dance with the town's pretty girls. A Queen of May would also be chosen to honor a local belle. Everyone had a good time and all went well until about 2:00 a.m. What followed gained Calico unwanted state attention.

James Patterson, the superintendent of both the Occidental and Garfield Mines was asked to step outside to see someone. He was accompanied outside by two friends, J. Marlow and W. E. Stoughton. As the trio stepped outside they were pelted by a volley of rotten eggs and Patterson was struck on the face with a bag filled with rock or sand. Their assailants were a blacksmith, William Foster, and four other men who also worked at the Silver King Mine. While attempting to dodge the fusillade of rotten eggs that kept coming at them, the trio drew their guns. Seeing that there was about to be an abrupt change in the character of missiles involved, the Silver King men began to run into the darkness. Foster however tried a different ploy; he raced past the trio and into the Town hall where a dance was in progress. Hot on his heels was an angered Marlow. Foster charged through the crowded dance floor as people began to sense something was awry. Amidst a cloud of foul odor and trailing raw egg which was probably beginning to fry on his heated countenance, Marlow began firing his pistol at Foster. Pandemonium reigned. People fell over each other as they made way for the running combatants. Against a background of screaming women and wails from terrified children, the sound of exploding gunshots filled the room. The bullets narrowly missed some of the bystanders and several of the women fainted. Marlow, gaining additional motivation, ran out the back door. Foster soon followed as both were swallowed by the darkness outside. As quickly as it had began, it ended. That was not however, to be the end of it.

The next day E.W. Williams judged those arraigned before him and meted out appropriate punishments. The *Calico Print* reported the proceedings in a news item that, to

the horror of respectable Calicoites, was soon raising eyebrows throughout the state.

In the *Print's* account, it was noted that, in a separate case, James Jordan was charged with assault to commit murder. The charge was reduced to simple assault, and Jordan was given the choice of \$75 or 75 days in the county jail. It was further noted that in the May Day case, J. Marlow had been charged with attempted murder. He had pled guilty and was fined \$50. The contrast between the two cases was startling.

The reaction throughout the state clouded the reputation of Calico and brought into question William's judgement. A reply was in order and William's account was published two weeks later in the *Print*. He complained that Marlow had been charged with, "... exhibiting a deadly weapon in a rude and angry and threatening manner to the danger and disturbance of the peace." The sentence was, in his opinion, appropriate and just.

The *Print* said that the difference was a matter of words and maintained its position saying there was as much difference as between "Tweedledum and Tweedledee."

Novelty and Usefulness Combined.

Wilson's Prepared Solder

Dispenses with the Soldering Iron.



It will save you both time and labor. One bottle of this Solder will mend all the tins you have laid one side for months, and make them good as new. Get them out and mend them. It is cheap—only 50 cents a bottle; it is convenient and compact. Use any kind of lamp that has a blaze no larger than a single wick; a spirit lamp will make no smoke. You may mend a dish or can over the best table without fear of spoiling it. Try it, and you will never want a soldering iron in the house again. What a saving to farmers. No more stopping up of holes in milk pans with a rag. Milkmen can mend their own cans. It does the prettiest job on any article you have in the house, from a pint dish to a wash boiler. It is a sure thing to stick when rosin and solder will not. It will stand heat as well as any solder ever used over fire.

PACIFIC COAST AGENCY, office of the Pacific Publishing Company, 31 Kearny street, San Francisco. AGENTS WANTED.

G. H. COOK,
A. H. MAYER,
Calico Street, Calico



Lucy Lane and Calicoites in front of the General Store, 1894

The Lanes

Among those arriving in 1885 was 10-year old Lucy Bell. When she was 17-years old, John Lane (aged 35) proposed to her at the foot of Sue Falls in Wall Street Canyon, near the 90-foot ladder. [Headframe, Sept./Oct. p.19] "So as not to rush things", they were married when she was 18. John had arrived in Calico in 1890 when he bought the water works. Two years later he bought a general store which Lucy helped him run. Their home was the old adobe Post Office and Courthouse of earlier years located on the west side of the Main Street (originally "Calico Street").

FIRE!

As with all mining camps of the west, fire was a constant threat. Being located in an arid climate did not help matters much, the wood dried out in a relatively short time.

The first fire occurred in 1884 but the damage was contained. In 1885 a fire started at the Globe Chop house and burned nearly a block. The most devastating fire was that of 1887. It became an inferno which created its own wind and in the process burned down virtually every building in town. The blaze was so intense that everyone was looking to salvage what they could, the water

works being incapable of delivering the water necessary for control.

Unlike other mining towns which had suffered the rages of fire, rebuilding was never accomplished with brick. Wood was still the choice. Although the ravages caused by the fires of 1884 and 1885 were quickly erased by new construction, it took three-years to recover from the fire of 1887. More adobe brick structures were built. Some leap-frogging was done by those who poured entire courses of the wall rather than using individual bricks. The remnants of these structures can still be seen around the town.

Death Valley or Bust!

A reduction in the available workforce occurred in April, 1890 when announcement of a major discovery was made 150 miles to the northeast. At Pahrump, Nevada, near Death Valley it was reported that a ledge 12-feet thick had been discovered that ran eight miles in length. Armed guards were in position to maintain possession and preclude "claim-jumping." The ledge was reported to be held together by the gold it contained.

Those that joined the rush found it would have been better to have remained in Calico. Typically, the strike was not as advertized.

Vignette

A CHRISTMAS TURKEY



As Christmas, 1882 approached, one bachelor miner of Calico approached Mrs. Oliver about cooking a special turkey dinner. His family raised the best turkeys found anywhere and were going to send him a turkey, but he needed someone to cook it. Mrs. Oliver agreed and told him he could bring his friends.

Just before Christmas the turkey arrived, carefully wrapped for delivery. Even before opening the package her nose told her that it had not survived the wagon-trip across the desert. Undaunted, and after giving the bird an appropriate burial, she hurried to her husband's store. She confiscated all six cans of turkey in stock.

On Christmas day there were twelve people seated at the table. The room was filled with the fragrances of good food and conversation. The miner raved on and on about how good the turkey was and how his family knew how to produce the best. A good time was had by all. One small thing had not been noticed, however. Each and everyone of those seated at the table had eaten a drumstick—twelve in all.

Truly a unique bird.

Borax

Closer to Calico, borax was discovered in 1890, east of town in Mule Canyon. As the borax mines opened, miners began to drift over

from Calico for a look-see. Calico became the primary labor pool for these new mines.

As the future of silver became cloudy, more miners sought work in the borax mines and the mill at Marion, north of Daggett.

The Price of Silver

As always in a silver camp, the price of its product was of primary concern. In 1873 the United States went off the bi-metallic standard. Only the price of gold remained fixed; silver varied at the whims of the world market. By October of 1882, silver had dropped to \$1.05 an ounce.

Calico, unlike many other mining camps, did not require outside capital. Its ores were rich enough that they easily made costs and even returned a handsome profit. It therefore was not subject to the wild swings of an outside stock market. As long as the work and silver lasted, and the price did not fall drastically, the local economy could be sound.

In 1890 the Bland-Allison Act and the Sherman Silver Purchase Act required the purchase of silver for coinage. The government literally made money on this—since only a portion of the coinage was silver.

This fact was always pointed out in the Treasury's annual report to Congress. In 54,500,000 ounces of silver was produced value at \$57,225,000 [\$272,500,000]. As coinage it had a value of \$70,464,645 [\$1,297,619,000]. This stabilized the industry and the jobs it provided. With silver at \$1.05 an ounce the 200 miners at work in the Calico Mining District produced \$200,000 annually. A 12-year peak in the price of silver occurred in June, 1891 when silver reached \$1.25 an ounce.

Kirwin & Flynn,

DEALERS IN

WINES, LIQUORS AND CIGARS.

EVERYTHING FIRST-CLASS.

BARBER'S CHAIR IN THE REAR.

CALICO, CALIFORNIA.



The dark bluff is the foot wall of the Silver King ore body (long since removed).

As the future of silver became cloudy more miners sought work in the borax mines and the mill at Marion, north of Daggett.

Due to the falling price of silver, efforts were being made to reduce miner's wages to \$3.00 per day. This was accomplished in 1893 with a sliding scale that dictated a wage of \$2.00 per day when silver was 65¢ per ounce and \$3.00 per day if it was \$1.00 per ounce.

Exodus

This variation in the price of silver eventually led to the demise of mining in Calico. The Waterloo Mine closed in 1892. Some mines closed in 1895 and the remaining mines became threatened by national politics.

The issue of bi-metalism became an issue which grew with every year until it reached the national level in the presidential election of 1896. William Jennings Bryan was for the unlimited purchase of silver and bi-metalism, while his opponent William McKinley stood for the maintenance of gold alone.

Calico was caught up in the tension of the election. The only two republicans in the camp were further ostracized when it became known that they would vote for McKinley.

All of Calico knew as never before that their future rode on this one election. All of the adult population was up throughout the night awaiting the election returns.

TEAMING.

ORE HAULING A SPECIALTY.

*The undersigned will
contract to haul ore in
Bulk or Sacked in any
quantity to suit miners*

**At
REDUCED
Rates.**

**Good Teams,
Tight Wagon Beds and
Careful Drivers.**

*Give me a trial and see
how entirely you will be
satisfied*

JOS. LE CYR.

As soon as it was discovered that McKinley had won the election, men began leaving. What had been a trickle became a flood as the town was being deserted. By the end of 1896, all of the mines were closed.

Only the Mulcahys and a few others remained to operate some of the mines as "chloriders" or lessees. According to the family history, in 1897, while still a teen-ager, Maurice Mulcahy accompanied a prospecting trio into the Rand Mountains in Kern County. Their discovery led to the famous Yellow Aster Mine. Maurice however, was not given a share. He returned to Calico to work with his brothers. The widow of one of these men, Dr. Rose Burcham, never felt this was right. For the rest of his life Maurice was granted favorable leases for operating the Burcham Mine.

The Latter Days

The Waterloo Mill at Daggett was sold for scrap during World War I. The huge fly-wheels were dynamited so they could be recovered. In 1915 the three large headframes in Calico were still visible sentinels of past mining activity. A few years later they too disappeared.

In 1926 the Zenda Mining Company did some exploration around Calico and then re-opened the Silver King Mine with the help of the experienced and knowledgeable Mulcahys. Silver was then worth 62¢ an ounce. When the price plummeted to 32¢ an ounce in 1930, they too closed.

In 1931 John Mulcahy died when his house caught fire. Maurice's son Joe had worked in the mines with his father but took an opportunity which led him to become a railroad engineer. The price of silver was so low that two could not live on the returns. By 1940, only Maurice Mulcahy was still operating, barely scraping together a living. He continued to lease the Burcham Mine and worked a few others. He was the last to mine the ores of Calico on a consistent basis. With his death in 1942, a long chapter of Calico came to an end. The Widow Burcham

gave the family \$300 to help with burial expenses.

Knott

In 1951 Walter Knott of Knott's Berry Farm fame, began the restoration of Calico. In 1966 the Knotts donated the townsite to San Bernardino County. It was made a park managed by the county's Regional Parks Department [*Headframe, Sept./Oct., 1990, pp. 14-16*]. It is one of the most popular parks in the county system today, receiving tourists from all over the world.

In the 1960's exploration drilling of the Waterloo Mine property and investigation of the Silver King and others was accomplished. In 1981 the ASARCO company completed exploration activity at the Waterloo Mine and obtained permits for a new operation. They discovered that the entire ridge containing the Waterloo and adjacent properties, contained 30,000,000 tons of silver ore that averaged 2.5 ounces of silver per ton. Capital costs were high: the cost of the mill was estimated to be in excess of \$100,000,000. Silver attained a value of \$50.00 per ounce during the flash of 1980 and then fell. The plans to mine are still on hold.

Since that time other companies have drilled around the district and have found small low-grade deposits. None have proved to have much potential with the present depressed price.

The Future

Typically all mining districts go through cycles due to the peculiar nature of mineralization, the market and the advances in understanding ore deposition and technology. Silver attracts little interest however.

The nature of **bonanza** silver deposits is such that they do not persist with depth. This was also the case in Calico. Many of the mines were exhausted of their large deposits within a few hundred feet of the surface. Those in the center of the system, such as the Silver King,

reached depths of 1000 feet with their workings.

The Calico Mining District still contains low-grade deposits of silver and a few small but high-grade deposits, many of which are submerged in the flooded workings of King Mountain.

In spite of the activity of the past, some lone prospector may again find a deposit somehow missed by those that preceded him. This situation has been demonstrated repeatedly all over the world.

The Calico Mining District will never see the type of activity it experienced a century ago. Given the nature of mineralized areas, a somewhat different sound of silver may, in the future, once more be heard in Calico. Only time will tell.



Period photographs: A.O. Russell



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MINING FAMILY**THE MULCAHYS**

Although born in Ireland, Maurice Richard Mulcahy had moved to Australia before coming to America. At the ripe old age of 17, he traveled to California to search for gold. He entered the goldfields during the 1850's. Unlike many he did quite well, making as much as \$1100 per week.

Catherine Cassidy and her twin-sister had emigrated from Ireland to the United States to work for a wealthy family in San Francisco. They left New York on a six-week journey by sea and the isthmus of Panama, and sea again, to San Francisco. They were 14-years old.

Maurice met and married Catherine when she was 20-years old. Their son Edward was born in 1863 and John followed in 1865. Annie and Jim followed.

About 1874 they moved to Pioche, Nevada where they leased and worked silver mines. Fred, Fannie and Maurice were born in Pioche. They were expecting twins in 1881 when Maurice had his fatal accident in the Washington & Creole Mine [*Past Tense*, p.64]. Catherine lost the twins.

Mrs. Mulcahy baked bread and cakes, while the younger children did cleaning, sold newspapers and did other odd jobs around town to keep the family together. Ed and John worked in the mines.

In 1884 the Widow Mulcahy left Pioche for the silver mines of Calico with her seven children.

Her sons in time gained responsible positions in the mines of Calico. After the crash of 1896, Ed, John and Maurice operated the Silver King and other mines within the district. Ed

later left to work in the San Francisco mint, where he died of pneumonia while studying law. John died when his house burned in 1931. Maurice continued on in Calico and discovered a gold vein named the Mulcahy, in the Burcham (Total Wreck) Mine. His only son Joe worked with his father in the mines, until he became a railroad engineer. The depressed price of silver could not support two miners in the family. Maurice was still working the mine when he died in 1942. Joe kept up the properties and claims and sold one of them, the Burcham, to ASARCO when they were exploring the Waterloo Mine. The family still has claims in the district but the still low price of silver makes the future uncertain.

FOR THE RECORD**THE MAGGIE MINE**

The Maggie Mine was not known as that during the heyday of Calico. It was located and operated as the Silver Monument Mine. The ore body was a shoot which angled up to the surface from the existing tunnel through which tourists enter the mine. The original access was through a shaft, now closed, on the east side of the hill.

Although there was a little high-grade ore near the surface, which was quickly mined, the remainder of the ore body never contained more than seven ounces of silver per ton. It was enough to provide a modest living.

Contrary to the story presently being told there, the Mulcahy brothers never lived there, and it was never so rich that it required guarding. They were also hardworking and intelligent.

John Mulcahy during a flush time bought it for \$1000 from the owners. He was living in an old wooden house that was adequate for the summer time but during the cold Calico winters it left much to be desired. So during the winters he used it as a warm place to sleep at night.

He was an old-time friend of the Lane's and used to socialize with them. Lucy Lane had a record which she played a great deal which they all liked. The song contained the poignant lyrics, "...when you and I were young Maggie..."

Reflecting upon the early days of Calico, which they all had experienced, it had a special meaning to them. It affected John in such a way that he changed the mine's name from the Silver Monument to the Maggie. And so it is today.

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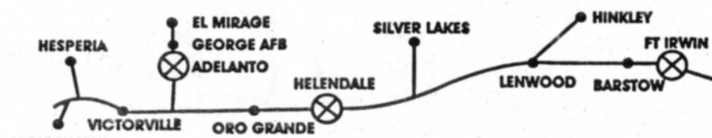
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This was to be accomplished through the use of hard-boiled eggs treated with DRC-1339 (Starlicide) and shotguns.

Starlicide kills in one to two days through kidney failure or central nervous system depression; this is considered a non-violent death. It also kills starlings, doves, crows, owls and other game birds.

The program had been in operation for seven days when it was abruptly halted by the court. The U.S. Humane Society had obtained a court order "staying" the project. Concern was expressed for non-target species such as coyotes, Golden eagles and birds which were not guilty of tortoise predation. The stay is still in effect while the program is being re-evaluated.

An interesting problem is presenting itself: both species are protected in one manner or another and a disparity of populations exists.

According to the 1984 Report, the *minimum* population of desert tortoise could be as high as 300,000 within the CDCA; and these occupying an area of about 40,156 square miles (about the size of Ohio or Kentucky). According to the Plan, 6450 ravens were sighted in 1989 within the *entire* CDCA.


Tortoise populations are decreasing. Ravens are intelligent, omnivorous, very mobile and have a considerable range. They have been known to fly 80-miles to feed, taking flight at the crack of dawn. When captured, ravens must be released a minimum of about 125-miles away or they will return to the same area.

Ravens can fly at a speed of 35-miles per hour and cruise at about 20 mph in the California Desert. Their range may be considerable.

Animal populations are dynamic and their numbers cyclical. In Yellowstone National Park for ex-

ample, a 25-year population cycle seems to exist. At the beginning of the century, when Theodore Roosevelt visited the area, many of the animals were at the peak of their cycles. As a result, the numbers were truly impressive.

Predator-prey relationships also change in response to environmental factors such as precipitation and weather. These numbers are never static. Unfortunately, many environmentally oriented actions fail to consider this factor. The result is an attempt to re-create a condition that may have existed within a very thin slice of time.

The tortoise may be experiencing a natural decline. Considering the large percentage of unexplained mortality, the raven's role may be overstated. Given the raven's inherent abilities, controlling them short of extirpation may be like trying to capture the wind. 

THUMBNAIL

EDGAR ALLAN POE

by Linda Mikels

Edgar Allan Poe was born on January 19, 1809, in Boston, Massachusetts. Unfortunately, his parents, David Poe Jr. and Elizabeth Arnold Poe, both died shortly after his birth. Consequently, he was raised by Mr. and Mrs. John Allan from whom he received his middle name. Edgar was educated in private schools in Richmond, Virginia and in England. He then attended the University of Virginia for one term, during which time his fiancée married another man. After he returned to Richmond in debt, a family quarrel ensued, and Edgar left home. Prior to leaving home, however, he suffered a brain lesion which caused manic periods and irresponsible behavior.

Edgar Allan Poe began writing poetry when he was very young. In 1827 his first volume of poetry was published. It was entitled *Tamerlane and other Poems*. He spent two years (1827-1829) in the army, and afterward his second volume of poetry was published. In 1830 he entered West Point Academy, where he

managed to get himself expelled within a year. In 1831 another volume of his poetry was published. This contained some of his best work.

Moving ahead with his life, Poe became editor of *The Southern Literary Messenger* in Richmond, Virginia, in 1835. His contributions manifested a talent for scathing reviews and tales of horror and wonder.

On May 16, 1836, the 27-year old Poe married his 13-year old cousin, Virginia Clemm. The following year he was fired from the *Messenger* for drunkenness after which he moved to New York and published his first novel.

From 1839 to 1842 Poe worked as editor of *Burton's Gentleman's Magazine* in Philadelphia and then *Graham's Magazine*. Among his most famous writing from this period is the first detective story in literary history, "*The Murders in the Rue Morgue*". (In the 1950s it was made into a 3-D movie of the same name.)


When Edgar Allan Poe moved to New York in 1844, he began to work on the *New York Evening Mirror*. His fame as a poet became firmly established in 1845 when his poem "*The Raven*" was published. Poe once defined poetry as "...the rhythmical creation of beauty;" that is a precise

description of *The Raven*.

After his wife died of tuberculosis on January 30, 1847, Poe was ill for months. Then in 1848 and 1849 Poe again became extremely active. He was engaged for a short time to the poet Sarah Helen Whitman, but in 1849 he returned to Richmond where he renewed his engagement with his now widowed childhood sweetheart.

On October 3, 1849, he was found gravely ill in a Baltimore tavern. He was taken to Washington College Hospital where he died on October 7.

Poe was known to have drunk in excess on occasion and to have used the drug opium, though not habitually. The exact cause of his death however, has never been established. As with all great literary artists, Edgar Allan Poe lives on through his magnificent work.

Poe was buried in the cemetery that later became known as Westminster Churchyard. On his birthday, three roses and a half-bottle of cognac have mysteriously appeared on his grave, since 1949. In addition to his name and dates of birth (which is incorrect) and death, Poe's tombstone is embellished with the image associated with his most popular work—a raven. 

PAST TENSE



The Raven

by Edgar Allan Poe

Once upon a midnight dreary, while I pondered, weak and weary,
Over many a quaint and curious volume of forgotten lore,
While I nodded, nearly napping, suddenly there came a tapping,
As of some one gently rapping, rapping at my chamber door—
"Tis some visitor," I muttered, "tapping at my chamber door—
Only this, and nothing more."

Ah, distinctly I remember it was in the bleak December,
And each separate dying ember wrought its ghost upon the floor.
Eagerly I wished the morrow;—vainly I had sought to borrow
From my books surcease of sorrow—sorrow for the lost Lenore—
For the rare and radiant maiden whom the angels name Lenore—
Nameless here for evermore.

And the silken sad uncertain rustling of each purple curtain
Thrilled me—filled me with fantastic terrors never felt before;
So that now, to still the beating of my heart, I stood repeating,
"Tis some visitor entreating entrance at my chamber door—
Some late visitor entreating entrance at my chamber door;—
This it is, and nothing more."

Presently my soul grew stronger; hesitating then no longer,
"Sir," said I, "or Madam, truly your forgiveness I implore;
But the fact is I was napping, and so gently you came rapping,
And so faintly you came tapping, tapping at my chamber door,
That I scarce was sure I heard you,"—here I opened wide the door,—
Darkness there, and nothing more.

Deep into that darkness peering, long I stood there wondering, fearing,
Doubting, dreaming dreams no mortals ever dared to dream before;
But the silence was unbroken, and the stillness gave no token,
And the only word there spoken was the whispered word, "Lenore!"
This I whispered, and an echo murmured back the word, "Lenore!"—
Merely this, and nothing more.

Back into the chamber turning, all my soul within me burning,
Soon again I heard a tapping somewhat louder than before.
"Surely," said I, "surely that is something at my window lattice:
Let me see, then, what threat is, and this mystery explore—
Let my heart be still a moment and this mystery explore";—
"Tis the wind and nothing more."



Open here I flung the shutter, when, with many a flirt and flutter,
In there stepped a stately raven of the saintly days of yore;
Not the least obeisance made he; not a minute stopped or stayed he;
But, with mien of lord or lady, perched above my chamber door—
Perched upon a bust of Pallas just above my chamber door—
Perched, and sat, and nothing more.

Then this ebony bird beguiling my sad fancy into smiling,
By the grave and stern decorum of the countenance it wore,
"Though thy crest be shorn and shaven, thou," I said, "art sure no craven,
Ghastly grim and ancient raven wandering from the Nightly shore—
Tell me what thy lordly name is on the Night's Plutonian shore!"
Quoth the Raven, "Nevermore."

Much I marvelled this ungainly fowl to hear discourse so plainly,
Though its answer little meaning—little relevancy bore;
For we cannot help agreeing that no living human being
Ever yet was blest with seeing bird above his chamber door—
Bird or beast upon the sculptured bust above his chamber door,
With such name as "Nevermore."

But the raven, sitting lonely on the placid bust, spoke only
That one word, as if his soul in that one word he did outpour.
Nothing further then he uttered—not a feather then he fluttered—
Till I scarcely more than muttered, "other friends have flown before—
On the morrow he will leave me, as my hopes have flown before."
Then the bird said, "Nevermore."

Startled at the stillness broken by reply so aptly spoken,
"Doubtless," said I, "what it utters is its only stock and store,
Caught from some unhappy master whom unmerciful Disaster
Followed fast and followed faster till his songs one burden bore—
Till the dirges of his Hope that melancholy burden bore
Of 'Never—nevermore.'"

But the Raven still beguiling all my fancy into smiling,
Straight I wheeled a cushioned seat in front of bird, and bust and door;
Then upon the velvet sinking, I betook myself to linking
Fancy unto fancy, thinking what this ominous bird of yore—
What this grim, ungainly, ghastly, gaunt and ominous bird of yore
Meant in croaking "Nevermore."



This I sat engaged in guessing, but no syllable expressing
To the fowl whose fiery eyes now burned into my bosom's core;
This and more I sat divining, with my head at ease reclining
On the cushion's velvet lining that the lamplight gloated o'er,
But whose velvet violet lining with the lamplight gloating o'er,
She shall press, ah, nevermore!

Then methought the air grew denser, perfumed from an unseen censer
Swung by Seraphim whose footfalls tinkled on the tufted floor.
"Wretch," I cried "thy God hath lent thee—by these angels he hath sent thee
Respite—respite and nepenthe, from thy memories of Lenore!
Quaff, oh quaff this kind nepenthe and forget this lost Lenore!"
Quoth the Raven, "Nevermore."

"Prophet!" said I, "thing of evil!—prophet still, if bird or devil!—
Whether Tempter sent, or whether tempest tossed thee here ashore,
Desolate yet all undaunted, on this desert land enchanted—
On this home by horror haunted—tell me truly, I implore—
Is there—is there balm in Gilead?—tell me—tell me, I implore!"
Quoth the Raven, "Nevermore."

"Prophet!" said I, "thing of evil—prophet still, if bird or devil!
By that Heaven that bends above us—by that God we both adore—
Tell this soul with sorrow laden if, within the distant Aidenn,
It shall clasp a sainted maiden whom the angels name Lenore—
Clasp a rare and radiant maiden whom the angels name Lenore."
Quoth the Raven, "Nevermore."

"Be that word our sign in parting, bird or fiend," I shrieked, upstarting—
"Get thee back into the tempest and the Night's Plutonian shore!
Leave no black plume as a token of that lie thy soul hath spoken!
Leave my loneliness unbroken!—quit the bust above my door!
Take thy beak from out my heart, and take thy form from off my door!"
Quoth the Raven, "Nevermore."

And the Raven, never flitting, still is sitting, still is sitting
On the pallid bust of Pallas just above my chamber door;
And his eyes have all the seeming of a demon's that is dreaming.
And the lamplight o'er him streaming throws his shadow on the floor;
And my soul from out that shadow that lies floating on the floor
Shall be lifted—nevermore!



TESTIMONY

HR918: The New *Anti*-Mineral Exploration and Development Act of 1991!

Representative Nick Rahall of West Virginia has re-introduced his mining bill (HR3866) which died with the last Congress. It is now known as HR 918 and is entitled the Mineral Exploration and Development Act of 1991. Like its predecessor it would repeal existing mining law developed for over a century which has given some measure of predictability and stability to one of our most high-risk, highly regulated and basic industries. In opposition to this proposal Mr. Sanregret, A.B., M.B.A., J.D., an attorney practicing in Santa Ana, California, represented the Western Mining Council, Inc. before the United States House of Representatives Subcommittee on Mining and Insular Affairs. We continue his abridged remarks before the Committee on September 6, 1990 in Washington D.C. which are still pertinent to the new bill. At issue here is the lack of knowledge regarding the very important role the General Mining Law continues to play in the discovery of mineral deposits in this country.

by Robert A. Sanregret

The Prospector

Most of the mineral discoveries in the Western United States have been made by independent private citizens under the U.S. Mining Law. Many of these mineral discoveries have resulted in major mines, with each mine complying with stringent environmental controls and reclamation requirements. The incentive for these citizen-prospectors is the Mining Law which provides an opportunity for U.S. citizens to prospect for minerals on public domain land, without damaging or degrading the land. The major U.S. mining companies agree that approximately 70-80% of their mines have come from discoveries by individual citizens prospecting for minerals under current U.S. Mining Law.

The California Chamber of Commerce stated in June, 1989 that: "Mining corporations would be crippled without the aid of the individual prospectors to help in the location and identification of future mineral deposits."

Today the mining Law is efficiently maintaining an effective system of locating, identifying and "inventorying" minerals for future development and use, "at no cost to the public."

There are thousands of private citizens who regularly explore for minerals in the United States, without degrading the environment.

The mineral discoveries by citizen-prospectors provide an efficient low-cost system of finding previously known mineral deposits on the public lands of the United States.

World-Class Mines

There are many world-class mines in the Western United States which were *discovered by individual private prospectors*, looking in areas not previously known to contain commercially valuable mineral deposits. These major mines include Molycorp's "Mountain Pass Mine" (a major world source of rare earths), Gold Fields Mining Corps.'s "Mesquite Mine" (over \$89,000,000 annual gold production), and U.S. Borax Corp.'s "Boron Mine" (60% of the free world's borates). These major mines in California, and many others elsewhere, would never have been developed without the incentives provided by the Mining Law. There are thousands of persons *today*, who regularly go out prospecting for minerals on U.S. public lands.

The U.S. Mining Law provides mineral prospectors with incentive: If a citizen-pro prospector finds a mineral deposit, then that person may develop a mine, *at no cost to the public.*

HR 918 and patenting are not "environmental issues". U.S. mining and mineral exploration is the most heavily regulated in the world, and mineral patenting today is closely monitored and controlled. The organized groups of environmental "activists" supporters of HR 918 must be recognized for their unreasonable anti-mining agenda of "No Mining, No Oil and No Development," anywhere in the United States.

In 1989 the American Mining Congress stated that: "The contribution of the small miner to the search for new mineral wealth is substantial, [and]...both the executive and legislative branches of government must assure the small miners' continued access to public lands to search for, develop and produce new mineral wealth without the fear that he will be unable to enjoy the fruits of his labors."

Increase Trade Deficit

HR 918 would increase the U.S. trade deficit by accelerating the exodus of mineral production companies and requiring increased purchases of foreign minerals.

One of the most significant permanent and long-term economic effects of HR 918 would be the increase in the U.S. trade deficit caused by our *importing* more foreign minerals rather than *exporting* them from the United States. At a time when our nation needs to stimulate the creation of new jobs, to improve the U.S. trade deficit and to strengthen the economy, the passage of HR 918 would operate directly counter to most of this country's

specific economic goals; and HR 918 would hasten or aggravate a recession. We must stop exporting jobs, and we must stop relying upon imported minerals (and oil) which we have reasonably available for production and development in the United States. The armed forces and private industry of the United States run on *minerals*, which should be *United States minerals*.

Exodus of Mines from the West

Consider the recent *exodus* of mines from the Western United States due to a combination of environmental and economic pressures (even before HR 918), including the following:

Steel. We are now overpaying for Japanese steel, processed from Brazilian iron ore. When the Eagle Mountain Iron Mine and the Fontana Steel Plant in (Riverside County, California) closed in 1983 due to environmental pressures and Kaiser's economic problems, the Japanese immediately stopped dumping steel in the U.S. and raised their steel prices substantially. Most West Coast steel today is purchased from Japan, and Japan purchases much of its iron ore from Brazil. The tragedy of the Eagle Mountain Iron Mine is that hundreds of *millions* of tons of usable iron ore are lying fallow and readily available in the U.S., while we buy Japanese steel at inflated prices. Brazil has cheap labor and minimal environmental controls; millions of tons are shipped from Brazil to Japan, and from Japan to the U.S., in diesel-powered freighters; and the world environment is more polluted. Kaiser created an estimated \$1,000,000,000 annually in total iron, steel and related production before Eagle Mountain and Fontana were closed down. The 1983 Kaiser closure *destroyed* and *exported* 20,000 jobs. Efforts to reopen the Eagle Mountain Iron Mine have been unsuccessful because of the continuing unrelenting pressure from the radical environmentalists who aggressively fight and development or mining anywhere in the U.S.

Rhodium. The price of rhodium soared from \$1300 per ounce in November 1989 to \$7,000 per ounce in July 1990, with industry predictions of \$10,000 per ounce soon. Rhodium is a platinum-group metal used in catalytic converters, and is imported primarily from South Africa. Rhodium is known to exist in small quantities on the US public lands; but exploration for rhodium will stop under HR 918.

Talc. We are now overpaying for Chinese talc. In 1987 a large U.S. talc mine was closed because of environmental pressures, the equipment was loaded into containers and shipped to Mainland China; and today we no longer export talc, but are now importing processed talc from China, to the detriment of our trade balance, local jobs and our standard of living.

Fiberglass. Colemanite was mined in the U.S. until recently when the mine was closed; and our major supplier is now Turkey. Hopes of reopening and developing this closed U.S. colemanite mine, or discovering new sources, would virtually disappear under HR 918.

Mercury. We are now overpaying for mercury. By means of a false environmental scare, the major U.S.

mercury mine at New Idria, California, was closed, dismantled and the homes and jobs of several hundred workers were literally destroyed. *After* the demolition of the houses and closing of the operation, it was learned that there was no "environmental hazard" at all, because the gravel and **tailings** upon which the town had been built were completely safe and free from mercury and other hazards, and the readings on mercury were even less than even the stringent "safe" and "normal" background standards.

Wollastonite. The non-metallic mineral wollastonite plays a critical role in energy conservation by use in high temperature ceramics, paints and plastics. Wollastonite is increasingly important in the development of energy-saving automobiles and other products. The major producer of wollastonite is Finland. Today, the world's largest known wollastonite deposit lies undeveloped on our public land; and the development of this prospective world-class U.S. wollastonite mine would be curtailed or stopped under the restrictions of HR 918 and related regulation and laws.

Decreases and Increases

If more U.S. mines are restricted or closed under HR 918 or similar laws, the present U.S. mineral production would have to come from elsewhere—**colemanite** and **borates** from Turkey, talc and **rare earths** from China, and steel from Japan made from iron ore shipped from Brazil. Our strict U.S. environmental controls do not exist in Brazil, Turkey or China. By "exporting" U.S. mining overseas, the result would be a *decreased* U.S. gross national product, a *decreased* U.S. standard of living, an *increased* U.S. trade deficit, and *increased* world pollution.

The "revenue" raised by HR 918 would be minimal, compared to its tremendous costs. Under HR 918 the U.S. public would "lose"; the U.S. mineral exploration and development industry would be devastated; the world environment would suffer; and the U.S. would still pay more, possible *much* more, for the very same minerals which would lie untouched on public lands in the United States.

What better example of the serious detrimental effect of our reliance upon and subservience to foreign sources of minerals and oil than the current oil "shortage" and the extreme measures, including war, that the U.S. is now contemplating in the Middle East to protect sources of oil. The same scenario, only worse, could well be repeated if the U.S. becomes subservient to *unreliable foreign sources of essential minerals*.

de facto Nationalization

The yellow flag is up; and *now* is the time for this subcommittee to fully investigate and determine the short and long term detrimental effects of the destruction of the incentive-based Mining Law and the *de facto nationalization* of the U.S. mineral exploration and development industry under HR 918.



OLD TOOLS OF THE TRADE

The Burleigh Rock Drill

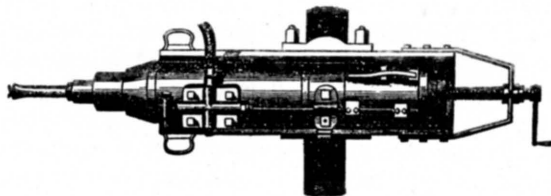
Cutting through rock had been a labor intensive and difficult chore since the dawn of time. At first this activity was limited to merely placing inscriptions and images on stone. When in the pursuit of minerals it became necessary to actually enter the subterranean world, the labor required skyrocketed. This need was eventually met by convict labor.

After the discovery of explosives, previous methodologies were abandoned. By detonating explosives placed in holes drilled in the rock, rock was broken and the **workings** could advance. Although more efficient than previous methods, it was still a labor intensive process to drill the holes.

In a process known as "single-jacking", a man could hold a drill with one hand and strike it with a four-pound hammer held in the other hand. By slowly rotating the drill before each hammer-blow a hole could be made in the rock. This prevented the drill from jamming in the hole. From time to time the pulverized rock was blown or scraped from the hole. With a crew of two, one man held and rotated the drill while another, hopefully well-coordinated, struck the drill with a 10-pound sledge hammer. Depending on the type of rock, two men could advance the workings two to four feet per 10-hour day.

In 1836 a Mr. Singer of Lockport New York patented a reciprocating piston driven drill but it never was manufactured. A patent was issued to J.W. Fowle of Philadelphia on March 11, 1851 for a piston-type drill. In 1852 the Fowle Rock Drill became the first such invention

to reach the market. Weighing hundreds of pounds and being unreliable, it did not meet with much success.



The Burleigh Rock Drill

In Europe, a similar machine, the Sommeiller Rock Drill, reached the commercial market in 1857.

The first large-scale use of the 440-pound Sommeiller drill was in the Mount Ceniz Tunnel in 1861.

Mount Ceniz Tunnel

Begun in 1857, this eight-mile long tunnel was the first to penetrate the Alps between France and Italy (completed in 1870). This 25'x 20' high

driven fan located at the tunnel's **portals**.

Four Sommeiller drills were arranged on four self-propelled carriages.

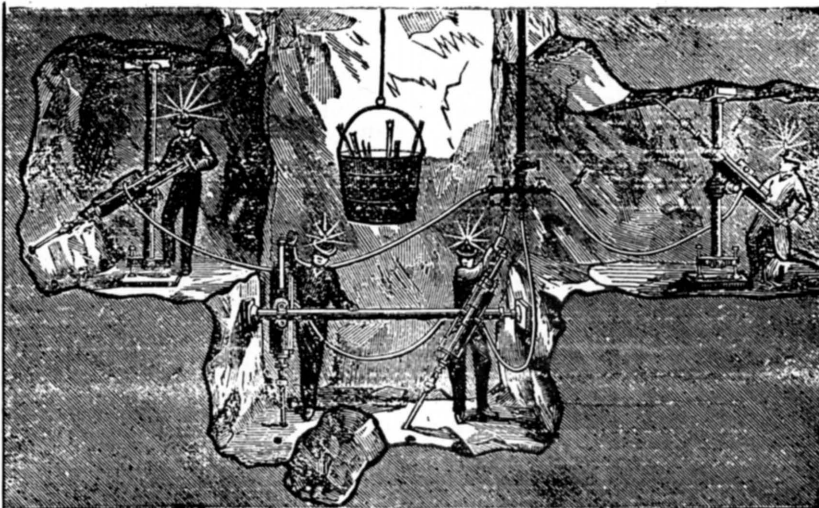
Blackpowder was loaded in to 80, 1½ diameter holes three-feet deep. Four, four-inch empty holes were also included in the pattern (this was the first use of the **burn-cut** method).

Although the Sommeiller drill worked better than the Fowle, that was not saying much. Because the machine could rarely drill even 12-inches without refitting, 200 of them were on hand to keep 16 working at all times. Although they cost 2.5 times that of hand-labor, they were none the less faster.

Other people recognized the ultimate value of these machines and began to ponder solutions to the problems.

Charles Burleigh of Fitchburg, Massachusetts was one of them. In

1865 he purchased the Fowle patent. Working at the Putnam Machine Works he spent over \$30,000 in development and patent purchasing costs to develop the Burleigh Rock Drill. He obtained a patent on June 1, 1866 for a machine with a drill attachment that could be driven with either compressed air or steam. Subsequent improvements were covered by another patent issued on November 27, 1866.



Drilling underground.

tunnel was also the first that did not use vertical ventilation shafts to connect with the surface. Ventilation of the tunnel was achieved by air exhausted from the drills which was supplemented by air moved by a 32-foot diameter water-wheel

The Burleigh Rock Drill was available in a number of sizes. They weighed 300-1000 pounds and ranged in length from 50 to 80-inches with cross-sections of 12"x15" to 14"x16".

The Burleigh could drill holes from 1.75 to five-inches in diameter.

Compressed air at pressure of 60-pounds per square-inch was needed for operation. Hammer-blows of 50-pounds per square inch were delivered to the drill at a rate of 250-300 per minute. The advance and rotation of the drill was automatic.

The holes produced advanced at the rate of two to six-inches per minute, depending on the type of rock. Holes of 30 to 84-inches in depth could be drilled without resetting the machine.

Being much more durable than the Sommeiler drill, the Burleigh could operate up to five days without a repair. This meant that only two machine were needed as backup to assure one would be operating at all times.

The Hoosac Tunnel

In 1866 the first major test of the Burleigh Rock Drill was made on the Hoosac Tunnel in Massachusetts. Started in 1855, the six-foot high by 15-feet wide was floundering. For nine-years all of the drilling had been accomplished by hand and the use of blackpowder. The tunnel was slated to eventually be widened to 30-feet and increased to 26-feet in height. When completed it would be 24,416-feet long. The mica schist and granite gneiss rock was being penetrated at a rate of 2.5-feet per round with a total advance of 10-feet per week. Abandonment of the project was being considered. Enter the Burleigh Rock Drill.

Using 10 Burleigh Rock Drills the work was continued. The Burleigh was able to drill holes at a rate of 1.2-inches per minute. Each round used six-pounds of blackpowder and 3½ pounds of nitroglycerin and advanced 3.5-feet, releasing a cubic yard of rock. Weekly advances rose to an average of 21-feet; with softer rock, advances reached the unheard of rate of 51-feet.

Completed in 1874 at a cost of \$398 per foot, the Hoosac Tunnel was probably saved from abandonment by the Burleigh Rock Drill.

In both the Mount Cenis and Hoosac tunnels progress would probably been even greater if they had used dynamite. Invented in

1863 by Alfred Nobel and patented in 1867, its use was rejected by both projects. The pairing of the Burleigh Rock Drill and dynamite would mark a great advance in mining technology. In 1869, at Silver Plume, Colorado the combination was used to construct a six by seven-foot drainage and a haulage tunnel 6600 feet in length. The name of this milestone tunnel: The Burleigh.



The Burleigh Rock Drill, Tripod Mount

The Sutro Tunnel

The Burleigh Rock Drill was first used on the Comstock Lode in the Yellow Jacket Mine in 1872. But another Comstock project was to be perhaps the most famous of the Burleigh Rock Drill rescues—the Sutro Tunnel.

The Sutro Tunnel was an ambitious project

designed to drain the Comstock mines of the hot water that was constantly being pumped out. It was to connect with the Comstock Mines 1750 feet below the surface. The Sutro Tunnel was to also provide an escape route in case of fire and provide a way of bringing ore to the surface without expensive hoisting.

On October 19, 1869 work began on the Sutro Tunnel. Early estimates made before the Burleigh came into prominence calculated that it would only take 3½ years to go the entire distance of 20,000 feet. Wrong! All work was being done by hand and the best they could do was 130 feet per month. The average monthly advance was 108-feet. Men and mules were moving and removing 5,922 cubic feet of rock per month. At this rate it would take another 10-years to complete the project. Enter the Burleigh.

On April 25, 1874, 5,850 feet inside the tunnel, the Burleigh Rock Drill showed what it could do. The miners were impressed and pushed the machines for all they were worth. Four Burleighs were in service by August. By September they were making 310 feet per month, more than double the old rate. In addition, this progress was being made with a larger tunnel: now 9½-feet high and 13-feet wide. Monthly totals of rock excavated rose to 38,357½-cubic feet. The Burleigh Rock Drill was credited with saving the Sutro Tunnel project from extinction.

The Burleigh Rock Drill was a machine that marked a major turning point in mining history.



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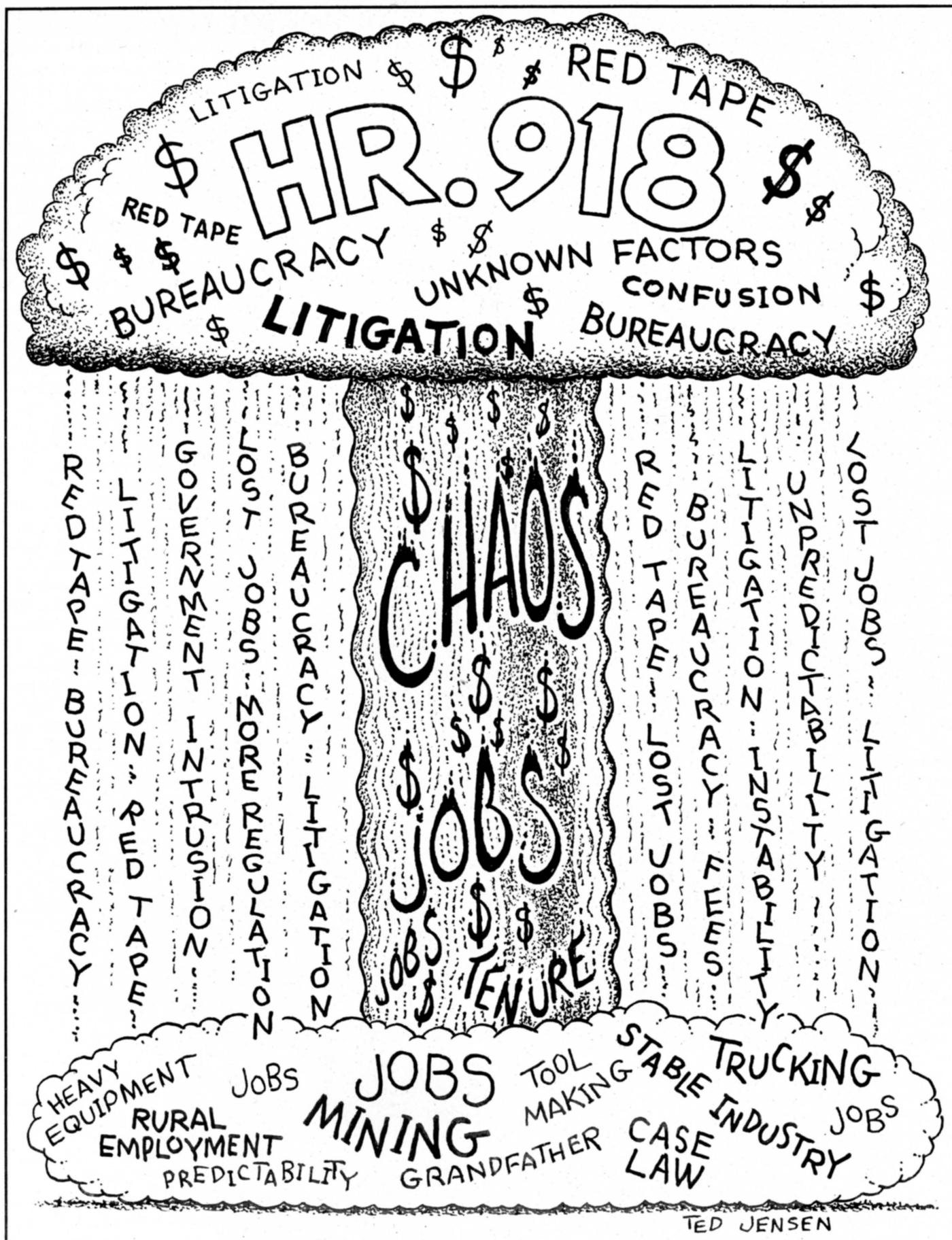
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OPINION

The Ecolosophers* Are At It Again

The ecolosophers are at war on many fronts in this country. Their targets are developers, farmers, the timber industry, industry in general and a long-time favorite, mining.

In the ongoing cultural war the ecolosophers are making a major attack on the industry. From their arsenal of misinformation, distortions and half-truths (which commonly come under the category of deceit), this well-financed [see pp. 58,59] group has enlisted politicians to spearhead their battle. The ecolosophers cloak themselves with righteous indignation at what they call injustices and unfairness. If what the ecolosophers were telling the politicians were true, such a position would be justified; but what they are told is *not* the whole story.

In all fairness it must be said that an ecolosopher's thinking is clouded by a Disneyesque view of what the world should be. They see the planet as being fragile, animals with happy families cavorting and living happily ever after, and the backcountry as a sacred temple. The only villain they see in all of this is mankind. With such a fictitious view of the environment it is no wonder that the ecolosophers take the positions they do. Reality is unsettling and disturbing.

Two green dragons recently released by the ecolosophers are in the form of legislation: H.R. 918 and its cousin S. 433. The target: the foundation of one of the country's most basic industries: mining. The foundation: the U.S. Mining Law.

ecolosopher (echo • loss • o • fer)

n. 1. One who speaks of something he perceives to be a problem, and (a) which he does not understand, and (b) attempts to make you believe its your fault, and (c) only he has the answer to it. 2. One who espouses uncertain premises based on faulty or false information as truth. 3. One who knows all about something but does not know that what he knows is not so. [*Gk. oikos* house + *sophia* wisdom + *Eng. er* uncertainty, false or misleading].

The ostensible target of these green dragons is what is erroneously referred to as "...one outdated 119-year old statute, the Mining Law of 1872."

There is not, however, one mining law. The body of U.S. mining law is formed from statutes, case law and U.S. Supreme Court decisions which have been put in place since 1807. Not a static and monolithic structure, it is the result of addressing problems associated with the development of a stable and predictable industry. Except for the nuclear energy industry, this country's mining industry is second to none in the world when it comes to the burden of *existing* regulation it bears.

The existing Mining Law system is the result of millions of dollars and uncounted time and effort expended to create the stable and predictable condition that exists today.

H.R. 918 would modify the mining industry like the Enola Gay modified Hiroshima and Nagasaki

Although there are about 85 statutes which affect the mining law system, the core of the mining law system in place today is the General Mining Law of 1872. This Act was designed to "Promote the Development of the Mining Resources of the United States." And as a judge commented a 1891 mining decision, "...The Acts of Congress [1866 & 1872]...were framed for the protection of miners..."

One unusual aspect of its creation was the background of its author. Unlike the senators and congressmen representing the ecolosophers, Senator Stewart had *direct and involved* experience with the mining industry [*Headframe* Sept./Oct., 1990 pp. 25, 26.] He *knew* what he was doing. Bringing his unmatched experience as a mining attorney to bear, the result was legislation that was both fair and which

avoided a great many of the problems that existed under the previous system.

The present legislative proposals bear the hallmarks of the ecolosopher's work: the sophist position of "the cost of doing business", no "grandfather clause", severe penalties, a door for "interested or affected citizens" to sue, destruction of a proven system, and little concern for the damage to be created.

Proponents of the legislation suggest that these bills will "modify the existing law." H.R. 918 and S. 433, if enacted, will modify the mining industry in much the same manner as the *Enola Gay* "modified" the landscape of Hiroshima and Nagasaki. These proposals would destroy a stable and predictable system that has taken over a century to build. In addition: the *de facto* nationalization of the minerals and exploration industry [see pp. 74, 75].

Who would benefit from these proposals? The ecolosophers.

The ecolosopher's proposal to place literally millions of acres of the California Desert off-limits to most of the public is known as S-21 and is sponsored by Senator Cranston of S & L notoriety. While discussing this proposal with an involved ecolosopher, I asked what the difference would be if S-21 were enacted. After a moment of thoughtful contemplation he responded: "We would probably be the only one's out there then." And they wonder why they are called elitists.

The ecolosophers are engaging society in nothing less than a cultural war. The goal being to impress the ecolosopher's view of things upon our society. To reach that goal requires that the rest of us give up some freedom and bear the resulting costs. Day by day we see evidence how their successes are affecting our lives and the loss of freedom it entails.

As Abraham Lincoln once said in another context, "Those who would restrict the freedom of others deserve it the least themselves."

Demetrius

FLORA

Mistletoe: The Tree Killer



All the wonders of the Christmas season! Mistletoe and the kissing privilege it bestows. If a lady pauses under a sprig of mistletoe, tradition has it that she may be kissed. It is such a popular Christmas decoration that even a plastic version is available. Made from one molded piece of green plastic, the berries are simply painted white.

A Scented Killer

But lurking behind all this gaiety is the fact that mistletoe is a tree killer. Its scientific name (*genus*) is "*Phoradendron*" which is Greek for "tree thief." Being a parasite, mistletoe robs the tree of its very life.

Mistletoe is of the *Loranthaceae* family. Although a parasite, mistletoe generates **chlorophyll**. It can be spotted as a dense clump within the foliage of a tree. In the winter it stands out even more when trees shed their leaves.

The color of the stems and bark of mistletoe ranges from yellowish- to dark green. The leaves are elongated and generally smooth, perhaps a centimeter in length. The berries are spheres two to four millimeters in diameter. When a clump of mistletoe dies it takes on a sickly-brown color. From a distance these dead clumps can look like a swarm of bees.

Oddly enough, all mistletoes have flowers of both sexes. Even stranger is the fact that mistletoe scent, which is most profuse in the evening, is apple-scented and can often be smelled for some distance from the source. The subsequent fruit, or berries range in color from white to yellowish green. At least one species has reddish berries.

For the Birds

Even though it possesses a bitter taste, some birds seem to like the mistletoe berries. Among these are bluebirds, robins, thrashers and quail. In the desert they provide both food and water for the avian population. Verdin and gnat-catchers even make their nests in dead clumps of mistletoe.

The leaves and berries of mistletoe contain a very sticky sap. The seeds that are ingested are passed through a bird's digestive system. Bird droppings readily attach to branches below and contain both the seeds



Tufted Mistletoe (*Phoradendron densum*)

and fertilizer. Due to its sticky pulp and sap, some seeds and sap adhere to the bird's beak. The birds remove them by rubbing their beak's on a tree branch. The seed then sticks to the bark and after germinating, integrates its circulation system with that of the tree and begins sucking away its life. Bad news for trees and shrubs is the high rate of seed germination.

As the mistletoe attracts more birds, more plants will sprout from the unfortunate host. If not

removed, the mistletoe will, in time, kill its host.

In the U.S. one large-leaved (1-2 centimeters) variety (*P. flavescens*) grows on such deciduous trees as red maple, elm and cottonwood. It is also found on apple trees.

In the western U.S. Juniper Mistletoe (*P. juniperinum*) is found on the Utah Juniper. In the mountains Piñon Mistletoe (*Arceuthobium divaricatum*) grows on the Piñon Pine. The berries of this particular mistletoe are under considerable pressure and when touched, explode, ejecting the seeds up to three feet away.

In western deserts the mistletoe *P. californicum* is commonly found on Juniper, Catclaw, Tamarisk, Palo Verde, Creosote and other shrubs. Its berries are a distinctive reddish color.

When infesting Desert Ironwood, mistletoe stunts the trees growth and produces spindle-shape nodules 2-3 feet in diameter and weighing 400-800 pounds. Seemingly in self-defense, the ironwood exudes a gum which attempts to push the mistletoe seed away from its bark.

Warning!

Although birds seem to have no problems eating mistletoe berries and there are some stories of Indians eating them also, mistletoe is toxic to humans and can kill.

All parts of the mistletoe plant are toxic; especially the berries toxic which contain amines-beta-phenylethylamine and tyramine.

Mistletoe poisoning symptoms include: stomach and intestinal pain, diarrhea, reduced pulse rate and ultimately, heart failure. This poisoned state can also be accompanied by nausea, vomiting, breathing difficulties, hallucinations, delirium and convulsions (*Plants that Poison*, Schmutz, Northland Press).

Mistletoe was one of the poisons used by the Romans. Its use was so widespread and favored that in his

writings the first-century historian Pliny lists at least 12 different antidotes. These range from radishes and ass's milk to such exotic mixtures as: cuprous oxide (CuO) and mutton suet, kid's stomach lining, pine pitch mixed with oil and bitter almonds, and vinegar mixed with oil from beaver testicles.

More utilitarian and medicinal uses of mistletoe were also found.

A contact-type glue was made from mistletoe berries. It was painted onto the branches and twigs surrounding a popular bird perching spot. When the birds arrived and were settled, they were startled. As they arose into flight their wingfeathers touched this glue and held them fast. They were then "harvested".

External medicine used mistletoe compounds to dry open sores, to soften abscesses, to treat wounds and in smoothing "scabrous" fingernails. Mistletoe was also considered a cure for epilepsy and female infertility.

Druids

In Europe the Druids searched for a particular oak bearing mistletoe. They believed anything growing in oaks during the winter to be sent from heaven and the tree marked by god himself. Oak does not often become host to mistletoe so it was a rarity. On the sixth day of the moon the Druids harvested mistletoe with a ritual.

The Druid priest, dressed in white, climbed the tree and cut the mistletoe from the oak with a gold sickle. The falling mistletoe was then caught in a white cloak before it touched the ground. Two white bulls were then sacrificed to complete the ceremony.

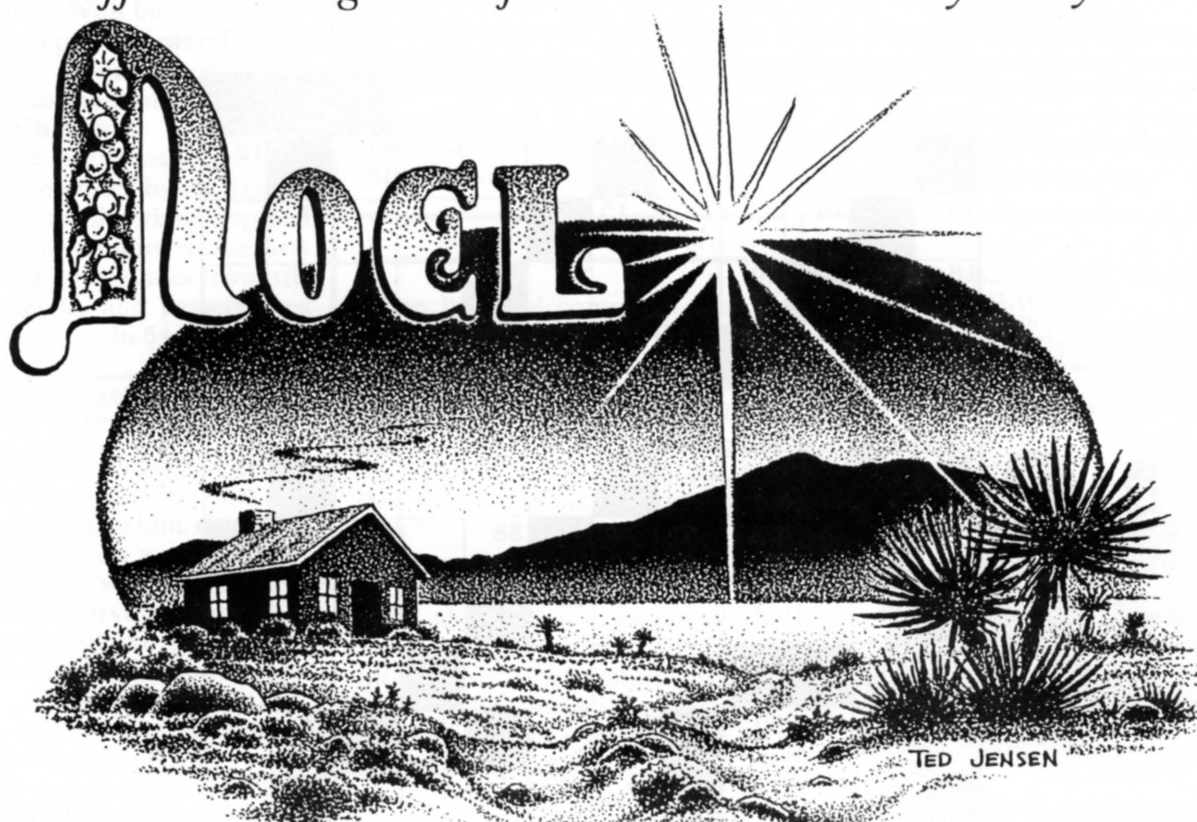
As for the custom of kissing under the mistletoe, it apparently originated in England. No one seems to be sure why or how the custom was introduced but even Dickens in his very popular *Christmas Carol* attests to its popularity and the kissing custom.

One thing that seems to have been overlooked in modern times is the fact that there was a limit to such activity. After each kiss the man was supposed to remove a berry from the mistletoe. When there were no more berries there were no more kisses. Hummm. Maybe the one-piece plastic version has some merit after all!



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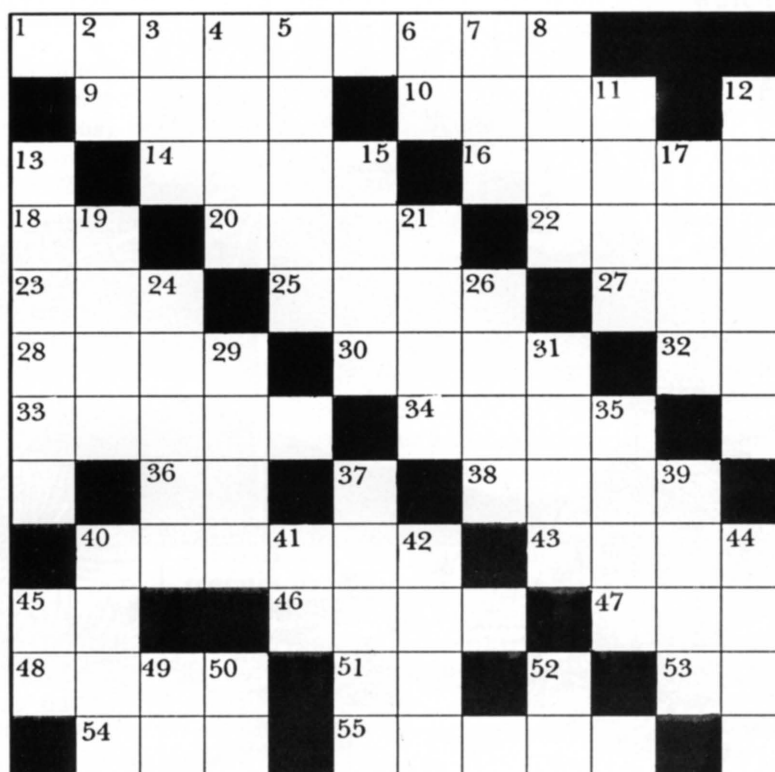
MERRY CHRISTMAS & a HAPPY NEW YEAR!

CROSSWORD**ACROSS**

1. Mining Magazine
9. Fatigue
10. Frog cousin
14. Agonize
16. Ego
18. Like
20. Eagle's dinner
22. Sesame or sunflower
23. Acreage
25. Pack away
27. Golf tool
28. Day in Roman Calendar
30. Beef fat
32. Note in diatonic scale
33. Cloaks
34. Deceased
36. For example
38. Sketch
40. Unusual item
43. Desserts
45. Oklahoma
46. Gait
47. Made a lap
48. Increase
51. Gold
53. Negative
54. Being
55. Carpus

DOWN

2. Extra-terrestrial
3. Point
4. Gallows trap door
5. Anxieties
6. Presence
7. Cleaning tool
8. Auditory organs
11. Menu
12. Recover
13. Mining town
15. Gains
17. Buck or doe
19. Carbonated drink
21. You had or you would
24. Lukewarm
26. Tare
29. Ovule
31. Waterproof canvas
35. Raised Platform
37. Dry stalk used for fodder
39. To detach or alienate
40. A light green vegetable
41. Thing
42. They, people in general
44. Cease
45. King of Bashan
49. _ else!
50. Us
52. Additional remarks



Answers: Page 86

ANTIQUITY

CHRISTIAN MINERS

The manual work required in the ancient mines was furnished by slaves and convicted criminals. The work was hard, the living conditions and treatment brutal. Work in ancient mines was a literal "hell on earth." The only thing conceivably worse than life in the mines was to be on the losing side in the midst of a pitched battle.

However, while a battle could last hours and perhaps an entire day, rarely did one condemned to the mines know how long his ordeal would last.

Life expectancy in the mines was determined by the physical condition of the worker and his desire to live or by the level of his hate for those who put him there. The average life expectancy seems to have been about three years.

One exception...

Ethnic origin of these slaves could be determined by the usual physical characteristics. With but one exception, religious preferences could not be easily determined among those condemned to the mines. That one exception: Christians.

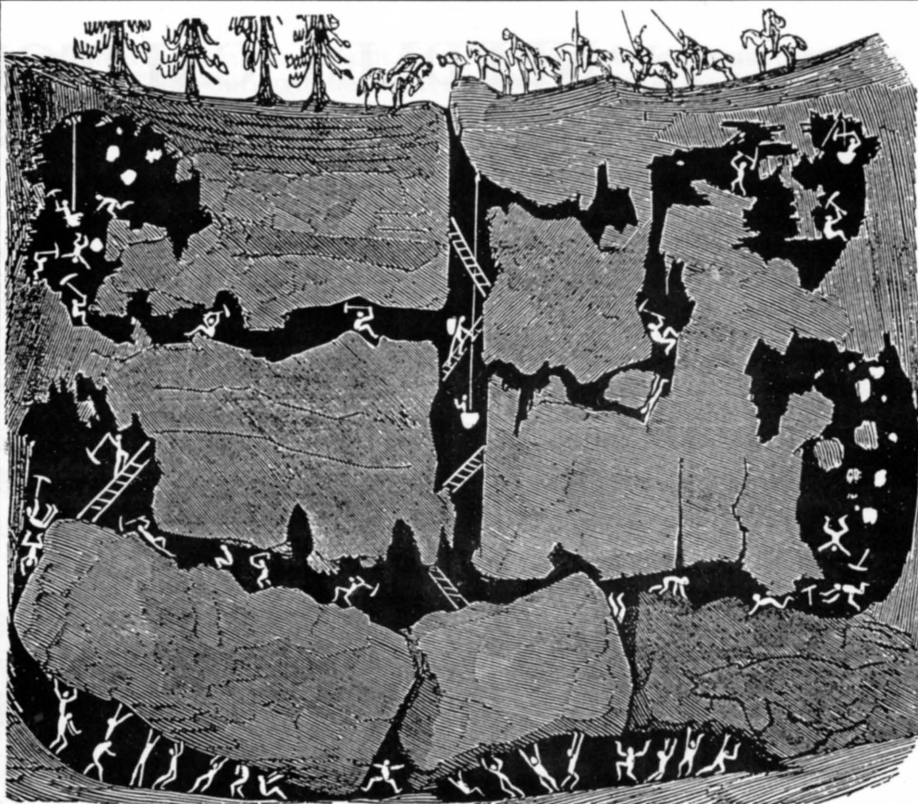
For a while, Christians and their beliefs were tolerated by the Roman Empire. But as Christianity spread throughout the Empire in the first century A.D., resistance towards Christians grew, and persecutions began under Nero in 64 A.D.

Atheists?

Since Christians would not recognize the divinity of the emperor and would not sacrifice to him, they were branded atheists. As a result, from time to time they were subjected to persecutions of varying intensity.

The severity of the persecution reflected the attitude and will of the emperor, but the actual punishment was generally determined by the local Roman officials.

When the emperor entered into the penalty phase of a persecution, the results could be severe. Chris-



Criminals working a mine (note guards on surface) and the hazards.

tians, before being sent to the mines, were subjected to an abuse which made them stand out among the other unfortunates.

An Imperial Edict

One imperial command read as follows:

"...they should be maimed by burning the sinews of the ankles of their left feet, and that their right eyes with the eyelids and pupils should be first cut out, and then destroyed by hot irons to the very roots."

This special marking did not end their abuse. For example at the Phaeno copper mines near Petra, (in modern Jordan), Silvanus, bishop of the churches around Gaza, was beheaded along with 39 others he had served there.

After 10 major "sanctioned" persecutions, they came to an end in 306 A.D. when Constantine the

Great became emperor. Since it was no longer a crime to be a Christian the heinous practices of the earlier emperors came to an end.

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11-12-13-14 October 1991

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The Twelfth Annual Mojave Road Rendezvous will be held in Needles, California October 11-14, 1991. The RENDEZVOUS is cosponsored by the *Friends of the Mojave Road* and the Bureau of Land Management and hosted by the City of Needles and the Needles Chamber of Commerce. This will be the second time this popular annual festival will be held in a city where there are motels, restaurants, and other facilities.

The RENDEZVOUS features four days of guided tours into the backcountry out from Needles. Caravans of about 20 vehicles each will make driving tours out to points of interest around Needles. There'll be tours to: the site of old Fort Mojave, along the Mohave & Milltown Railroad to Oatman, Mopah Springs (hiking), Fort Piute (hiking), a segment of the historic Mojave Road, parts of the First and Fourth segments of the East Mojave Heritage Trail, introductory tours of the East Mojave National Scenic Area, the Havasu National Wildlife Refuge, walking tour of Needles, archeological sites containing petroglyphs and ground figures, and others. The caravans will be accompanied by a guide who, in most cases, will lecture over CB radio during the tour. Many tours require four-wheel drive. The purpose of the tours is to introduce people to the East Mojave backcountry and to show them how it can be used and not abused.

To participate in the RENDEZVOUS, contact the *Friends of the Mojave Road* right away with a card or phone call. They will mail you a packet with all the details and the registration form about the 1st of August. Call 619-733-4482 or send a card to: *Friends of the Mojave Road*, Goffs Schoolhouse, P.O. Box 7, Essex, CA 92332. You may also contact the BLM office in Needles at: 619-326-3896 and obtain the packet from that source or the Needles Chamber of Commerce at 619-326-2050.

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For Further Reading

Calico

The published geologic sources were mentioned in the last issue (Sept./Oct., 1990). A readable account containing a number of chapters by some who had lived in Calico during its heyday is the book *"Mining on the Trails of Destiny"* written by Lawrence and Lucille Coke. They lived in Calico from 1934-49 and while working the old Silver King Mine, collected what they could of the past history. Long out of print it is a difficult book to find however.

Ravens

An excellent source of information on Ravens is found in the book *"Ravens in Winter"*. Written by Bernd Heinrich, Professor of Zoology at the University of Vermont, it covers the period he spent (one year of sabbatical and three additional winters), in Maine studying ravens. What prompted his initial interest was the fact that ravens shared their food, a behavior not common in the animal world beyond infancy. He writes of his search as it occurred. False premises and assumptions which cause setbacks in the pursuit of knowledge are presented along with his successes. Published by Summit Books (Simon & Schuster), it is in print, and can be found or ordered from most bookstores.

*Xerobates & Corvus**



TED JENSEN

* Desert Tortoise & Raven

commissions welcome



1 H	2 E	3 A	4 D	5 F	R	6 A	7 M	8 E			
	9 T	I	R	E		10 T	O	A	11 D		12 R
13 C		14 M	O	A	15 N		16 P	R	I	17 D	E
18 A	19 S		20 P	R	E	21 Y		22 S	E	E	D
23 L	O	24 T		25 S	T	O	26 W		27 T	E	E
28 I	D	E	29 S		30 S	U	E	31 T		32 R	E
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45 O	K			46 T	R	O	T		47 S	A	T
48 G	R	49 O	50 W		51 A	U		52 P		53 N	O
	54 A	R	E		55 W	R	I	S	T		P

GLOSSARY

alluvium: Erosion products moved and/or deposited by water.

argillization: The creation of certain clay minerals from wall-rock by hydrothermal activity.

ash: Un-cemented pieces of broken rock ejected by volcanic activity.

bastnasite: A rare-earth ore containing the elements cerium (Ce), lanthanum (La) and fluorine (F).

basement: Igneous rocks of the earth's crust upon which sedimentary and other rocks rest.

batholith: A mass of rock hundreds of square miles in area that has been intruded into older rocks.

blackpowder: Gunpowder.

bonanza: A very rich discovery. (Spanish: success, fair weather.)

borate: A salt of boron compounds.

boron: An element with the chemical symbol B.

breccia: Pieces of broken rock. (Italian: "rubble".)

burn-cut: A pattern of drilled holes in rock, some of which are not loaded with explosive. Increases the amount of rock broken with a given amount of explosive.

calcining: The process of heating the mineral calcite (CaCO_3) to drive off carbon dioxide (CO_2) to produce CaO (quicklime).

caldera: An area of the earth's crust that has collapsed into a chamber from which volcanic eruptions have removed molten rock and gases.

cement: A dry chemical powder made from limestone with gypsum, iron, silica and other minerals added; activated by water which triggers a chemical reaction which liberates carbon dioxide and heat.

cerium: An element with the chemical symbol Ce. Found in rare-earth minerals.

chlorophyll: The green nitrogen compound which gives plants their green color.

contact: The surface between two different kinds of rock.

country rock: The rock enclosing veins; the dominant rock of a region.

crosscut: A passageway within mine workings which connects parallel workings.

cyanide: A chemical composed of one carbon (C) atom and one nitrogen (N) atom; in chemistry it is generally compounded with a metal such as potassium (K) or sodium (Na) which is readily dissolved in water. Also as an ion in solution (CN^-), or the lighter-than-air gas (HCN).

dip: The angle a geologic surface is inclined from the horizontal; measured at right angles to the strike.

doré: An alloy of gold and silver. (French: gilt, gilded, golden.)

drift: An underground horizontal passage which follows a vein.

Druid: An ancient Celtic religious order of pre-Roman Gaul and Britain.

electrum: An alloy of gold and silver, variable ratios, about 50:50.

epithermal: An ore deposit classification characterized by minerals formed at temperatures between 50°C and 150°C within 3000 feet of the surface by hydrothermal solutions and accompanied with wall-rock alteration producing large amounts of chlorite and other alteration minerals.

europium: An element with the chemical symbol Eu. Found in rare-earth minerals. Produces the magenta color in color television tubes.

fault: A fracture in the earth's crust along which movement has occurred.

footwall: The surface below a fault, vein or ore body.

gadolinium: An element with the chemical symbol Gd. Found in rare-earth minerals.

gangue: The worthless minerals in an ore deposit.

genus: A biologic category above species and below family.

granite: A plutonic igneous rock composed primarily of feldspar and quartz.

gneiss: A coarse-grained metamorphic rock characterized by banding produced while in a plastic condition.

gouge: A layer of soft material composed of clay or crushed rock along a vein.

gypsum: A hydrous calcium sulphate ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$)

halo: Generally a diffuse zone of minerals surrounding an ore deposit.

hanging wall: The surface above a fault, vein or ore body.

headframe: The frame-structure located over a mine shaft which enables the hoisting of men, materials and ore from within the mine to the surface.

high-grade: Gold ores containing 0.1+ ounce of gold per ton.

hydrothermal: Hot, mineral-bearing solutions; literally: hot water.

igneous: Rock solidified from a molten state. (Latin: "fire".)

illite: A clay mineral composed primarily of mica minerals.

Jurassic Period: A period of geologic time estimated to have been between 135-155 million years ago.

lanthanide: A group of elements found within rare-earth minerals; atomic numbers 58-71.

lanthanum: An element with the chemical symbol La. Found in rare-earth minerals.

latite: The volcanic extrusive rock equivalent of the plutonic rock monzonite.

lava: A extrusive fluid rock produced by volcanic activity.

leach pad: An graded-base structure with an impervious sheet of material upon which crushed ore is placed for leaching out the metals it contains.

level: A horizontal passage within an underground mine numbered from the surface, e.g. the 100-foot level.

low-grade: Gold ores containing less than 0.1 ounces per ton.

magma: Molten rock within the earth.

Mesozoic: A geologic era covering geologic time between 67-246 million years before the present.

metamorphosed: Altered, changed to something different.

mica: A group of silica minerals with a sheet-like structure.

mil: One-thousandth of an inch.

mine-run: Ore as it comes out of the mine before any processing.

mining district: A self-government area established by miners with defined boundaries and rules of operation.

Miocene: An epoch of geologic time estimated to have been between 5-23 million years ago.

monzonite: An igneous plutonic rock with less than 2% quartz; if the quartz content 2+%, it is quartz monzonite.

NaCN: Sodium cyanide.

neodymium: An element with the chemical symbol Nd. Found in rare-earth minerals.

normal fault: A fault resulting from a fracture in the earth's crust caused by tension; one side of the fault drops relative to the other.

nitroglycerine: An oily liquid explosive; a constituent of dynamite.

ore: An economic term indicating a mineral that can be mined for a profit.

ore bin: A bin with a sloped floor for storing ore.

ore chute: An u-shaped channel for moving ore by gravity.

outcrop: Portions of veins or formations exposed on the surface.

Paleozoic: A geologic era covering geologic time between 246-575 years before the present.

Pliocene: An epoch of geologic time estimated to have been between 1.6-5.3 million years ago.

pH: The chemical measure of acidity or alkalinity on a scale of 0-14.

portal: The surface entrance to a mine.

plutonic: Coarse-grained rock which cooled at depth, within the earth's crust.

pregnant: Leachate solutions containing precious metals.

pyroclastic: A general term applied to rocks fragmented by volcanic activity.

quartz: A common mineral found in veins; silicon dioxide (SiO_2).

raise: A vertical or angling passageway within a mine that reaches up and connects two or more levels; it does not reach the surface. The reverse is a winze. Which way you look (up or down) determines which it is.

rare-earths: Oxides of a group of metallic elements with atomic numbers from 57-71.

rhodium: An element with the chemical symbol Rh.

rhyolite: A fine-grained volcanic rock that is identical in composition to granite.

round: Can refer to: a hole of set of holes for blasting or the hole or set of holes loaded with explosives to be detonated at one time or the detonated explosion of a hole or set of holes for a blast.

saline: Salty character; a group of evaporite minerals.

samarium: An element with the chemical symbol Sm. Found in rare-earth minerals.

schist: A metamorphic rock characterized by a sheet-like texture.

shaft: A vertical or inclined passageway from the surface into a mine.

sheave: The large grooved wheel (pulley) mounted on top of a headframe. It permits the hoisting-cable to hoist from a shaft.

shoots: Sections of a vein where faulting across the fissure prior to mineral deposition permitted the formation of a roughly circular form. These portions run up the vein and have cross-sections thicker than the vein itself.

Continued →

EDITORIAL

View from the Sheave Wheel: When is it a Mine?

Mining activity on the North American continent has occurred for at least the last 8000 years. With the colonization of the continent by Europeans in the 17th century came a more intense need for minerals. These needs were met by imports from abroad. In the 18th century, this foreign dependence began to decline as entrepreneurs began to discover and develop this continent's natural resources. After the Revolutionary War and independence, the United States established its first mineral law to encourage this activity in 1807.

The first authenticated gold discovery in the U.S. occurred in 1799 on the Reed Plantation in North Carolina, but the vein was not found until 1831. The California gold rush created perhaps the largest non-militarily induced migration the world has ever seen. Subsequent mineral prospecting in the Western U.S. intensified and spread after the Civil War as many left unpleasant memories and places for regions untouched by the conflict.

The relics of the prospector's work can be found in many remote areas. Those travelling the American outback have seen evidences of this labor sprinkled across hillsides and canyons of the west.

These sites are often referred to as "mines".

In the public mind this has become a generic term for a variety of such mineral-related activities. In much the same way "tailings" have been used to describe what are technically waste dumps.

The question then arises, "Well, what is a mine?" Perhaps better phrased would be the question, "When is it a mine?"

All mining activities are directed at the ultimate goal of finding ore and production of the specific mineral (or element) it contains.

"Ore" itself is actually an economic term applied to mineral deposits. Ore can be defined as any rock (or mineral occurrence) that contains enough mineral to be mined and marketed at a profit. No simple formula can be applied to determine what is an ore. Variable mineral markets and mining costs have a significant impact on this determination. A given grade of mineralized rock may be an ore at one time and place but not at another. This is a simple fact-of-life that those determined to repeal the core of the mining laws should be aware; the mining industry is impacted more by market than nearly any other segment of U.S. industry.

In the search for ore, three different activities have been circumscribed that lead to what is properly called a mine: prospecting, exploration and development.

"**Prospecting**" is the process of searching for indications of valuable minerals in the earth's crust. This activity includes preliminary exploration to test the value of any indication found and to delineate its location below the surface. Activities commonly observed in prospecting are the construction of, pits, trenches, shafts, adits and tunnels. Drilling and geophysical programs are also employed. The property being prospected is a "prospect", not a mine.

"**Exploration**" of a mineral deposit in part overlaps prospecting. The goal is to determine if enough mineral is present with favorable geological and physical conditions to qualify as ore. Included in this activity is the construction of workings to enable the approximate quantity and quality of ore to be determined. The prudent operator often extracts ore in order to defray operating expenses; but is still a prospect and not a mine. If the factors considered are favorable, additional activities are initiated to convert the prospect to a mine.

"**Development**" of a prospect is the final stage between exploration and mining. Development is the preparation of the property for actual mining. This activity is a commitment to the creation of a mine. This stage includes the construction of additional mine workings, installation of equipment, building access roads, mill and other buildings and, if necessary, rail transport. When these are completed, a mine is in place.

"**Mining**" is the systematic removal of ore.

To some these distinctions may seem fussy. They are however, significant. It is more important than ever before that these distinctions be recognized by the public and especially the regulators and politicians. Those who are attacking the industry flourish and revel in an atmosphere of ignorance.

Without these distinctions being applied, regulators are crippling the industry with regulations and controls that at best, are only appropriate for a mine. The premature application of restrictions and controls to prospecting and exploration activities is already strangling future mineral production in this country. If this trend is not reversed we will find ourselves back in the 17th century with our mineral needs being met by foreign supply. This in turn could conceivably lead to a multiplicity of "Desert Storms". This we do not need.

M.E.II



GLOSSARY

(Continued from page 87.)

Tertiary: A period of geologic time estimated to have been between 2-67 million years ago.

tuff: A rock composed of compacted, small, volcanic rock fragments.

tunnel: Technically a horizontal passageway that opens at the surface on both ends, i.e. it penetrates the hill or mountain. Common usage denotes a horizontal passageway extending from the portal through country rock to a vein; any horizontal passageway that is not an adit or drift.

vat-leach: The leaching of ore within a vat.

silicification: The process of introducing or creating silica (quartz) by hydrothermal activity.

stockwork: An ore deposit consisting of a multitude of closely-set fractures in rock that have been filled with ore minerals over a broad area.

strike: The horizontal line along a geologic structure measured by compass bearing; perpendicular to the dip.

tailings: The waste from an ore milling operation; not to be confused with the waste dump outside a mine portal.

talc: A very soft, white magnesium silicate mineral.

terrace: Relatively flat or slightly inclined surface bounded by steeper ascending and descending slopes.

vein: A tabular structure far thinner than it is long; quartz or other minerals filling a fracture or fault in the country rock.

vug: A cavity, generally filled with mineral crystals.

wall-rock: The rock on either side of a vein or ore deposit.

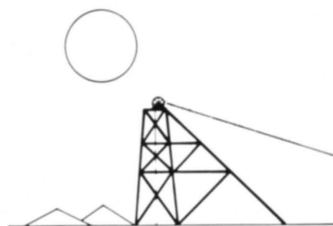
winze: A vertical or angular passageway within a mine that reaches down to connect two or more levels of a mine. It does not reach the surface. The reverse is a raise. Which way you look (up or down) determines which it is.

wollastonite: A calcium silicate mineral.

workings: The collective underground passageways, levels, drifts, et cetera, that are found in a mine.

yttrium: An element with the chemical symbol Y. Found in rare-earth minerals.

SENTINELS IN THE WEST HEADFRAME



ENTER THE WORLD OF MINING & THE 1990's

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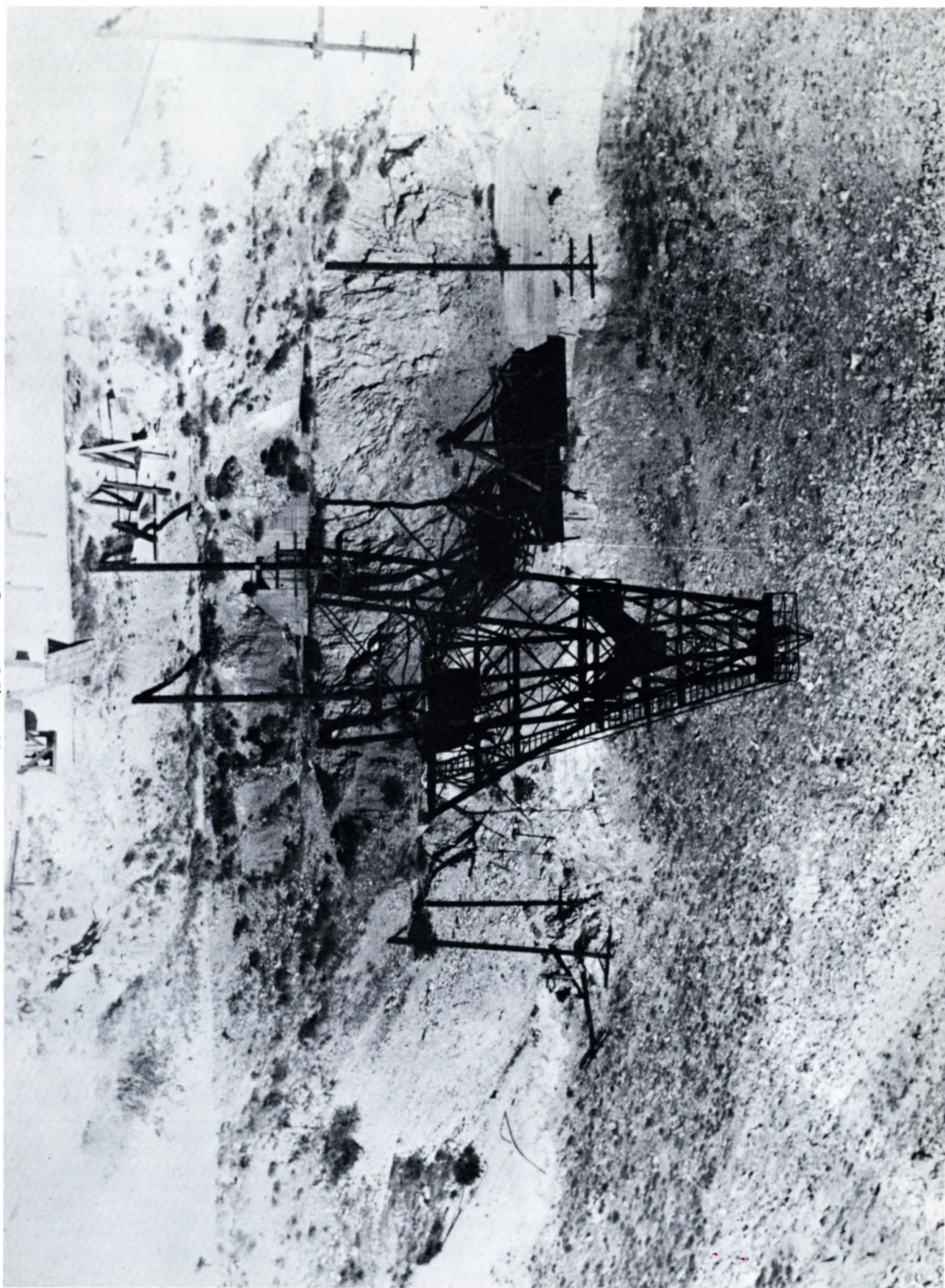
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The Cactus Queen Mine Site, 1990